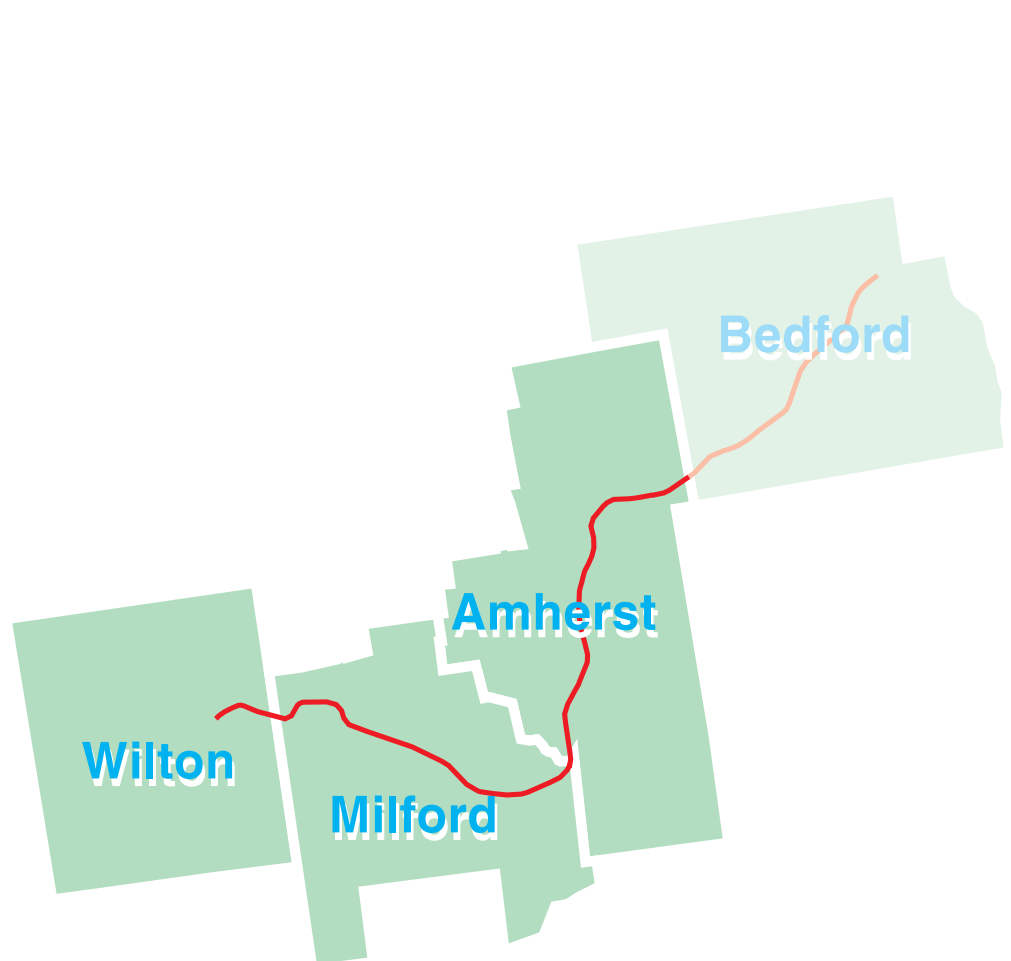

New Hampshire Route 101 Corridor Plan

Amherst, Milford, Wilton

Final Report

September 2002



Prepared for the Nashua Regional Planning Commission (NRPC) by:

*Wallace Floyd Design Group
Vanasse Hangen Brustlin, Inc.
RKG Associates, Inc.*

Table of Contents

1.0 Executive Summary	4
2.0 Introduction	9
3.0 Inventory and Analysis	11
<i>3.1 Traffic Volumes</i>	<i>11</i>
<i>3.2 Pedestrian and Bicycle Transportation</i>	<i>29</i>
<i>3.3 Economic Development Profile</i>	<i>31</i>
<i>3.4 Land Use and Development Regulation</i>	<i>40</i>
<i>3.5 Conservation Land</i>	<i>55</i>
<i>3.6 Utilities</i>	<i>55</i>
<i>3.7 Corridor Visual Analysis</i>	<i>57</i>
<i>3.8 Natural Systems</i>	<i>67</i>
<i>3.9 Historic and Cultural Resources</i>	<i>73</i>
<i>3.10 Summary of Issues and Opportunities</i>	<i>75</i>
4.0 Vision for the Future	77
5.0 Strategy and Evaluation of Corridor Improvement Concepts	79
<i>5.1 Strategy</i>	<i>79</i>
<i>5.2 Evaluation Criteria</i>	<i>80</i>
<i>5.3 Traffic Operations Analysis</i>	<i>82</i>

6.0 Proposed Roadway Improvements	88
<i>6.1 Amherst East of the Bypass</i>	<i>88</i>
<i>6.2 Bypass in Milford and Amherst</i>	<i>90</i>
<i>6.3 Transition from Western Milford to Wilton</i>	<i>93</i>
<i>6.4 Improvements in Wilton</i>	<i>95</i>
<i>6.5 Pedestrian and Bicycle Improvements</i>	<i>96</i>
<i>6.6 Corridor Aesthetics</i>	<i>97</i>
<i>6.7 Development Guidance and Review</i>	<i>102</i>
7.0 Implementation	106
<i>7.1 Priorities and Cost</i>	<i>106</i>
<i>7.2 Implementation Process</i>	<i>106</i>
8.0 Acknowledgements	110
Appendix A - Public Meeting Notes	
Appendix B - Design Guidelines for Milford Industrial Area (BROX)	
Appendix C - RKG Market Study of the BROX Property	

Executive Summary

1.1 The Problem



Morning peak period congestion in Bedford



Concept for the Nashua Road overpass

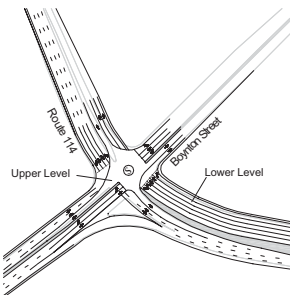
Route 101 gets a little worse every year: congestion, accidents, traffic that should be on the highway is cutting through residential neighborhoods. In Bedford, Route 101 is a barrier that cuts the town in half, separating neighborhoods and dividing the town center. In Amherst, congestion is increasing north and east of the bypass section, making it increasingly difficult to make turns into and out of side streets and driveways. On the bypass, congestion causes the eastbound off-ramp at Route 101A to back up onto the highway. Nine fatal head-on collisions have occurred in the past ten years, almost double the statewide average. In western Milford, there is serious congestion at the traffic signals and in the stretch of highway between the Souhegan River and the railroad tracks. In Wilton, there are safety problems due to poor sight lines and outdated intersection geometry, making access to and from the highway difficult.

As bad as these problems are today, they will get worse if nothing is done. Traffic projections anticipate 35 to 50 percent more traffic in 20 years. The result will be more congestion, with level of service failure on the bypass, in western Milford, and in Amherst north and east of the bypass. This will result in more short-cutting through residential areas, more accidents, and a continuing barrier dividing the towns, particularly in Bedford where the highway passes through the town center. It will be more difficult and hazardous to enter and leave side streets and businesses. Commercial development with direct highway access will continue to occur, particularly in Bedford and Wilton, potentially changing the character of the highway.

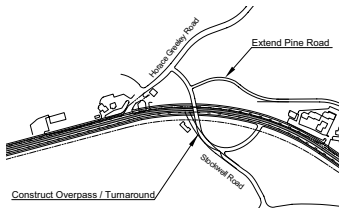
1.2 The Strategy

The Route 101 Corridor Plan is a strategy to reduce problems and realize benefits. It has several key parts:

- Access to the highway must be managed for safety.
- Intersections and then roadway segments must be improved to make them safer, accommodate traffic and reduce traffic diverting through residential neighborhoods. Ultimately, Route 101 should have four travel lanes (two in each direction) from Route 114 in Bedford to western Milford, with a landscaped median (not a barrier) to control left turns. In Wilton, improvements to shoulders and intersections may be sufficient to make the two-lane section adequate for the 20-year horizon of the Plan.
- In Bedford, the Joppa Hill/Stowell Road and Hardy/Jenkins Road intersections should be improved and signalized, and the Meeting-



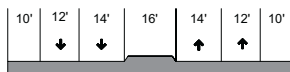
The proposed reconstruction of Route 101/114 as a two level intersection will benefit people in all four corridor towns.



A local overpass proposed at Horace Greeley Road in Amherst will allow traffic to safely access side streets and driveways.



The constrained stretch of Route 101 in western Milford will be relieved by extending the bypass.



NH 101 Cross Section

The improved cross-section on the bypass will provide safe separation of travel lanes and capacity for future traffic volumes.

house Road, Constitution Drive intersections should be improved, greatly reducing congestion. In the longer term, the Route 114/101 intersection should be totally reconstructed.

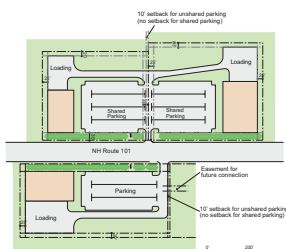
- An overpass for local traffic, pedestrians and bicycles at Nashua Road should be provided, reconnecting the north and south halves of Bedford's Town Center. The connector road from Nashua to Wallace Road which was proposed at the May 2002 public meeting should be relocated behind Route 101 businesses.
- A boulevard cross-section with a landscaped median, tree-lined roadway, and development guidelines for Bedford's commercial center would make the center a better place to do business and shop. The improvements would also signal drivers to slow down.
- In Amherst, local overpasses at Horace Greeley Road and Walnut Hill Road would provide connections between neighborhoods and permit traffic to reverse direction, access businesses, and make right turns to enter and leave side streets and driveways instead of left turns.
- When the bypass is widened to four lanes with a vegetated median, interchanges should be improved. A flyover ramp from Route 101A to westbound Route 101 would relieve congestion and encourage drivers to use Route 101 instead of passing through Milford's local streets. Ramp improvements at NH Route 101A and NH Route 13 would provide better acceleration distances and relieve off-ramp backups onto the highway.
- In western Milford, the bypass should be extended approximately half a mile, rejoining the existing highway west of the Wilton Road intersection. This would relieve the congested intersections and the bottleneck between the river and the railroad. Access would be improved for existing commercial and industrial uses and new development on the BROX site.
- In Wilton, intersections at Abbott Hill Acres and Intervale Road should be improved, left turn lanes provided, and a traffic signal added at Greenville Road (NH Route 31 south).
- Roadway improvements should be well-landscaped and guidelines for commercial development should be implemented to improve aesthetics and manage access in Bedford and Wilton. Design guidelines for the BROX property should be implemented to ensure a quality development for the benefit of the Town of Milford.
- Hazardous left turns must be reduced, and turning traffic should be directed to appropriately designed intersections to enter and leave the highway safely; there will be some inconvenience but the people affected will directly benefit from increased safety. Provisions must also be made for left turns into business entrances.



*Landscaped
boulevard section
in Bedford*



*Concept for
gateway
landscaping at
Route 13 in
Milford*



*Illustration of
good site
planning for
commercial uses
in Wilton*

Because the highway will operate better with these improvements than at present, traffic diverting to neighborhood streets will be substantially reduced in Bedford's historic town center, Meetinghouse Road, and the neighborhood south of Donald Street. Short-cutting in Amherst and Milford will be similarly relieved by improvements to the bypass and its interchanges with Route 101A and Route 13.

Some property would need to be acquired by NHDOT at some locations in Bedford and Milford, but in general the highway right-of-way is adequate. Few or no buildings would be needed to be relocated or removed in Bedford. Property would need to be acquired at the Black Forest Bakery/Café in Amherst, the development site next to Route 101A interchange in Milford, and for the bypass extension in western Milford. The most significant impact would be at the Meadowbrook Industrial Park, where the full or partial taking of one building would be necessary. Property owners would be fairly compensated for takings or easements. Some wetland impacts would occur in Bedford and Amherst, but they would be limited in extent and can be minimized through design; wetland permits are part of the design process. These issues will be addressed during engineering design, which includes assessment of environmental impacts and a public process.

The Corridor Plan will result in a safer, better operating, and better looking Route 101, a stronger town center, reduced traffic diversion to local streets, facilities for pedestrians and bicycles, and the capability to better control and guide commercial development.

1.3 The Result

- A safer roadway with less congestion.
- Less diversion of traffic into residential areas.
- A better commercial center in Bedford encouraging lower vehicular speeds and accommodating pedestrians, and better conditions for development in western Milford and Wilton.
- An attractive highway corridor through all four towns, preserving existing character.

1.4 Next Steps

The Route 101 Corridor Plan is a first step toward action. The second step is detailed engineering of each project. The Corridor Plan summarizes what the improvements are expected to look like, their size, and their level of impact. Detailed analysis of wetland impacts and property requirements will be part of preliminary engineering, and there will be a public process for each project to review the design and suggest improvements. Locations of left turns will be determined through this process.

The recommended improvements would cost \$43 to \$48 million in Bedford over 10 or more years. The total cost would be \$52 to \$53 million in Amherst through Wilton, nearly half of it for widening and extending the bypass and making it safer. These projects are all eligible for federal funding at an 80% level. Route 101 is a regional facility, and all the recommended actions in the Corridor Plan are part of a coordinated strategy to improve safety and traffic operations; therefore, the remaining 20% of project costs should be borne by the state with little or no contribution by the towns.

The Bedford Town Council voted to approve the Bedford Route 101 Corridor Plan on August 14, 2002; next, the Southern New Hampshire Planning Commission must approve it. The Corridor Plan for Amherst, Milford, and Wilton has been reviewed by town officials and the four-town Steering Committee, where it was coordinated with the Bedford portion of the Plan. The recommended improvements will be incorporated into the regional Long Range Transportation Plan by the Nashua Regional Planning Commission. All actions in the Corridor plan for the four towns must win the approval of New Hampshire DOT to be included in the next revision of the state Long Range Transportation Plan. Coordination with DOT has been ongoing throughout the study.

Adopting design guidelines is a town action that can be undertaken over the next year or two, following technical drafting, study by the planning boards, and public hearing.

The following table shows the implementation sequence for the Route 101 Corridor projects.

Route 101 Corridor Implementation Chart

Phasing of Amherst-Milford-Wilton Improvements	Cost (\$million)	Phasing of Bedford Improvements	Cost (\$million)
Immediate Action (this year)			
Safety warnings for the Milford bypass using variable and fixed message signs.			
Urgent Actions (within 3 years)			
Overlay of Milford bypass from western end to Route 101A and painted 4-foot median to increase safety margin.	\$0.4 to \$0.6 mil	Improvement of the Hardy/Jenkins intersection with a traffic signal and left turn lanes	\$2 million
		Elimination of the 101/114 bottleneck by extending the merge past Old Bedford Road.	\$0.5 million
Short-Term Actions (within 3 to 5 years)			
Geometric and sight-line improvements in Wilton	\$1 million	Nashua-Bell Hill overpass for local traffic and connector road from Nashua Road to Wallace Road.	\$4.5 million
		Center left turn lanes at Kahliko Lane, Gage Girls Road to Elk Drive, and Twin Brook Lane.	\$1 million
Medium Term Actions (within 5 to 10 years)			
Widening of Bypass to 4 lanes with median from western end through 101A interchange (includes Rte 13 and Rte 101A interchange improvements, flyover ramp, and gateway landscaping)	\$21.2 million	Improvement of Meetinghouse Road intersection (5-lane cross-section)	\$2 million
Bypass extension in western Milford (includes gateway landscaping)	\$5.2 million	Widening of Route 101 to 4 lanes with median divider from Route 114 to Meetinghouse Road	\$3 million
Local service overpass at Horace Greeley Road (installation of median can be added prior to full 4-lane section if coordinated with Joppa Hill Rd improvements in Bedford)	\$2 million	Creation of 4-lane boulevard from Meetinghouse Road to Wallace Road with landscaped median providing places for left turns.	\$3 million
Local service overpass at Walnut Hill Road, allowing traffic to reverse direction	\$2 million		
Long Term Actions (within 10 to 15 years)			
Widening of Bypass to 4 lanes with median from 101A interchange through Amherst Street interchange (includes gateway landscaping)	\$6 million	Widening of Route 101 to 4 lanes with median divider from Wallace Road to Hardy/Jenkins Road.	\$4 million
Widening of Route 101 to 4 lanes with median from 101A interchange through Walnut Hill Road, with local service road connection from overpass to Amherst St via Limbo Lane	\$7.6 million	Improvement of Joppa Hill/Stowell Road intersection with traffic signal and jug-handle turn-around connections.	\$2.5 million
Widening to 4 lanes with median from Walnut Hill Road to Bedford Town Line. (must be phased with or after Joppa hill intersection improvement in Bedford)	\$3.6 million	Widening of Route 101 to 4 lanes with median divider from Hardy/Jenkins to Amherst Town Line	\$6 million
Improvement of shoulders in Wilton and Greenville Road intersection improvement (includes gateway landscaping)	\$3.5 million	Reconstruct Route 114/101 intersection as two-level signalized intersection.	\$15-20 million

2.0 Introduction

2.1 Genesis of the Route 101 Corridor Study

Route 101 is the principal east-west corridor in southern New Hampshire. As New Hampshire developed and grew in population, and as vehicle miles traveled increased at a dramatic rate, problems inevitably occurred: reduced traffic flow at key intersections, increasing number of accidents, conflicts between through traffic and local access to side streets and commercial driveways, and impacts on the quality of life in the towns traversed by the highway. It is time for action by the four Route 101 Corridor towns to address current and future problems by identifying ways to improve the highway while at the same time managing access and guiding future development in a manner that improves both the economy and the quality of life in all four towns. Recognizing this need, and with the support of New Hampshire's congressional delegation and the New Hampshire Department of Transportation, NRPC obtained funding through NHDOT for the Route 101 Corridor Study in Wilton, Milford, and Amherst. (Bedford, which lies outside the NRPC region, obtained separate funding for its portion of the corridor study.) The plan for the corridor study called for a high level of community involvement in each town, coordination of the study through a Steering Committee, and a work scope that addresses both the transportation and land use issues in the corridor.



Amherst Village



Milford Oval



Downtown Wilton

2.2 NRPC Role

The Nashua Regional Planning Commission is directing the study in its member towns. NRPC maintains a database of information on transportation, land use, and natural resources. This information is the basis for many of the maps in this report, with coordinated information provided by the NRPC Geographic Information Systems (GIS) staff. NRPC's transportation staff did a significant amount of field work to provide traffic counts at key intersections in the study area during the summer and fall of 2001. Additional traffic and land use information was provided by the consultant team.

2.3 Study Process

The Route 101 Corridor Study began with a series of public meetings in each of the three NRPC member towns in May 2001. These meetings were well attended and yielded a large number of issues and concerns to be addressed in the study, with safety being the most important. Workshops were held in each town in January 2002 to develop a draft vision for the Corridor Plan. That vision statement provided the roadmap for the development of strategies and concepts for improving the corridor. Preliminary options were presented at two meetings held in April and May in Milford and Amherst. Draft final recommendations were presented to town officials

of each town at their publicly attended meetings, and a final public meeting was held in September 2002 to present the Corridor Plan. Final revisions were made in response to this last round of meetings.

The Town of Bedford recently completed a Corridor Plan for its portion of the Route 101 Corridor. A Corridor Study Steering Committee comprised of members from all four towns and Nashua Regional Planning Commission met regularly throughout the development of both planning documents to coordinate the work in all four towns and ensure that the recommendations of both documents are consistent and compatible. New Hampshire DOT has been kept informed of progress and has reviewed the Bedford recommendations. A meeting with DOT on the plan for Amherst, Milford and Wilton will be held shortly after publication of this report.

2.4 Report Overview

This Final Report on the Route 101 Corridor Study addresses the towns of Wilton, Milford, and Amherst. The report documents the Corridor Study in these towns, covering transportation, economics, land use, aesthetic and environmental issues and opportunities in the first nine sections. The report also includes a Vision Statement for the Corridor in these three towns, reflecting input received at the Visioning Workshops. Summaries of all public meetings and these workshops are included in the Appendix to the report.

The next section of the report presents a strategy to realize this vision and the criteria used to evaluate options for transportation improvements. The following sections present the recommended transportation improvements, landscaping recommendations, and measures to guide development and manage access. The concluding section is an implementation program for The Route 101 Corridor Plan, with a phased action list and discussion of the implementation process.

3.0 Inventory and Analysis

3.1 Traffic Volumes

To determine the existing traffic volume demands and flow patterns along the corridor, the Nashua Regional Planning Commission (NRPC) conducted an extensive traffic volume count program during the fall months of 2001. Weekday morning (7:00 – 9:00 AM) and weekday evening (4:00 – 6:00 PM) peak period manual turning movement counts were conducted at seventeen intersections along the corridor. The peak period traffic volume counts were conducted at the following intersections with Route 101.

- Horace Greeley Road
- Amherst Town Transfer Station (Count conducted on Saturday 9:00 - 11:00 AM.)
- Walnut Hill Road
- The Meeting Place
- Amherst Street Interchanges
- NH 122 Interchanges
- Route 101A Interchanges
- Route 13 Interchanges
- Old Wilton Road/Phelan Road
- Elm Street (Route 101A)/North River Road
- Wilton Road
- Abbott Hill Road/NH 31 North
- Greenville Road (NH 31 South)

To supplement the intersection turning movement counts, 24-hour automatic traffic recorder counts were conducted at key locations along the corridor. The existing condition traffic volumes are presented in *Figure 1*. A summary of the automatic traffic recorder count data is presented in *Table 1*.

TABLE 1
Route 101
Existing Traffic Volume Summary (2001)

	Average Weekday Traffic Volume (vpd)	AM Peak Hour (vph)	Percent of Daily Traffic	PM Peak Hour (vph)	Percent of Daily Traffic
East of the Meeting Place	22,020	1,800	8.2	1,890	8.6
East of NH 13	25,600	2,150	8.4	2,080	8.1
West of NH 13	18,950	1,460	7.7	1,530	8.1
East of Old Wilton Road	19,270	1,620	8.4	1,580	8.2
East of Wilton Road	22,100	1,580	7.2	1,870	8.5
East of Greenville Road	14,740	1,100	7.4	1,240	8.4

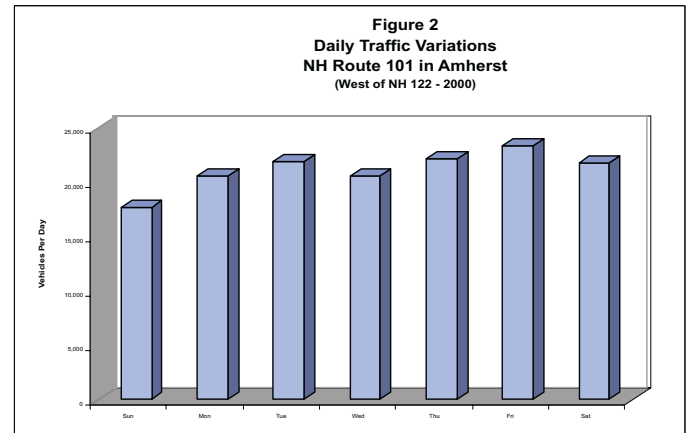
Figure 1



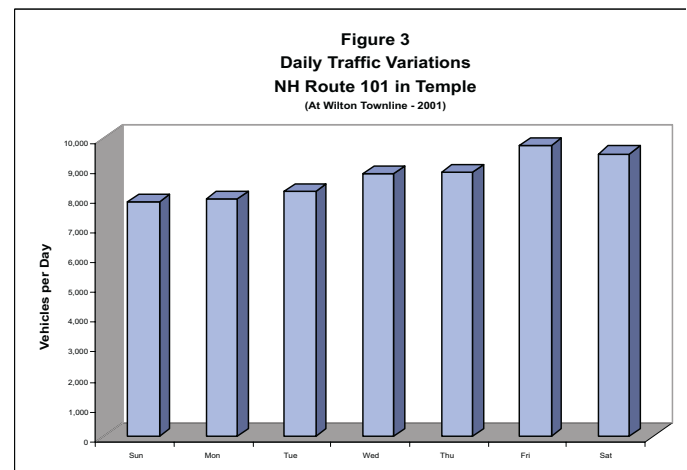
As shown in the table, the 2001 Average Weekday Traffic (AWDT) along Route 101 ranges from approximately 25,600 vehicles per day (vpd) east of Route 13 on the bypass section of Route 101 in Milford to 14,740 vpd east of Greenville Road at the west end of the study area in Wilton. Peak hour traffic volumes range from approximately 7.2 to 8.6 percent of the AWDT. Directional flow is predominately east-bound (62 percent) in the AM peak hour and westbound (57 percent) in the PM peak hour.

New Hampshire Department of Transportation (NHDOT) maintains two permanent count stations on Route 101 within the study corridor. Data from these count stations in Amherst (north of NH 122) and in Temple (at the Wilton town line) provide valuable insight into the traffic flow characteristics of the existing corridor.

A review of daily traffic volume variations along Route 101 (north of NH 122 in Amherst) during the month of August 2000 revealed little variation during the weekdays with the weekday volumes ranging from approximately 20,600 vpd to 23,300 vpd with the low volume recorded on a Wednesday and the high volume recorded on a Friday. Saturday traffic reflected the average traffic volume throughout the week at 21,700 vpd, while Sunday traffic was significantly lower at 17,600 vpd. The daily variations in Amherst are depicted in *Figure 2*.



At the west end of the Route 101 corridor, daily traffic volume variations (at the Wilton town line in Temple) during the month of August 2001 show the weekday daily volumes exhibiting a steady increase in volume as the weekend approaches. The weekday volumes range from a low of 7,900 vpd on Monday to a high of 9,700 vpd on Friday. The Saturday daily volume remained relatively high at 9,500 vpd. This trend is reflective of the more recreational nature of the western end of the corridor as compared to the daily variations in Amherst, which reflect a more typical commuter pattern. The daily variations in Temple are depicted in *Figure 3*.



A comparison of the hourly variations for a typical weekday and a Saturday, as expected, reveal markedly different trends. *Figures 4 and 5* show the hourly traffic variations for a weekday and a Saturday during the winter of 2001 – 2002 along Route 101 west of Route 13 in Milford. Route 101 exhibits typical commuter route characteristics with well-defined morning and evening commuter peak periods. The morning commuter period peaks between 7:00 and 8:00 AM, with the commuter period over by 9:00 AM. The volume of traffic remains relatively constant throughout the late morning and midday with an increase in volume experienced by early afternoon. The PM commuter period extends from 3:00 PM to 6:00 PM. By comparison, on a Saturday the volume of traffic remains relatively high and constant from 11:00 AM to 6:00 PM.

Figure 4
Hourly Variations in Weekday Traffic
NH Route 101 in Milford
(West of NH 13 - 2001)

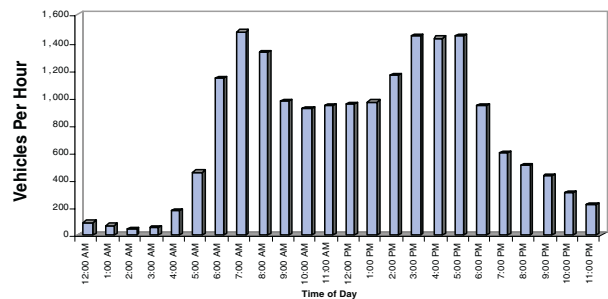
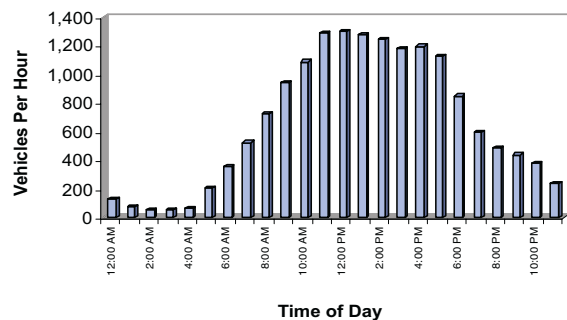
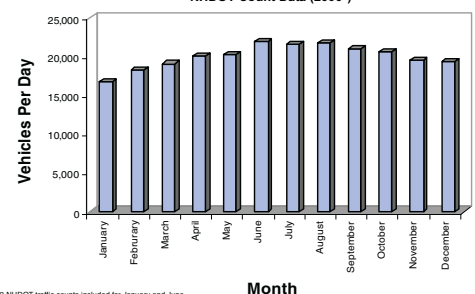


Figure 5
Hourly Variations in Saturday Traffic
NH Route 101 in Milford
(West of NH 13 - 2001)



An examination of historical traffic volume data collected by the New Hampshire Department of Transportation (NHDOT) at its permanent traffic recorder station located along Route 101 in Amherst provides monthly traffic volume variations for a weekday and a Saturday. The data show that for a weekday, the highest daily volumes occur during the summer months of June, July, and August. The lowest daily volumes were recorded during the months of January and February. Interestingly, the highest volume month when only considering Saturday traffic is October. The high weekend traffic in October is most likely reflective of foliage related recreational activity. The monthly variations for weekday and Saturday traffic are depicted in *Figures 6 and 7*.

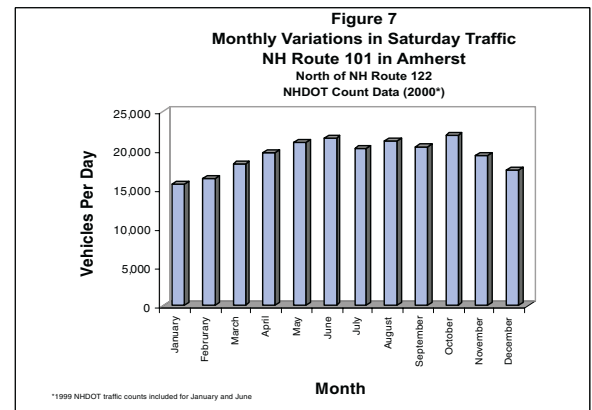
Figure 6
Monthly Variations in Weekday Traffic
NH Route 101 in Amherst
North of NH Route 122
NHDOT Count Data (2000*)



*1999 NHDOT traffic counts included for January and June

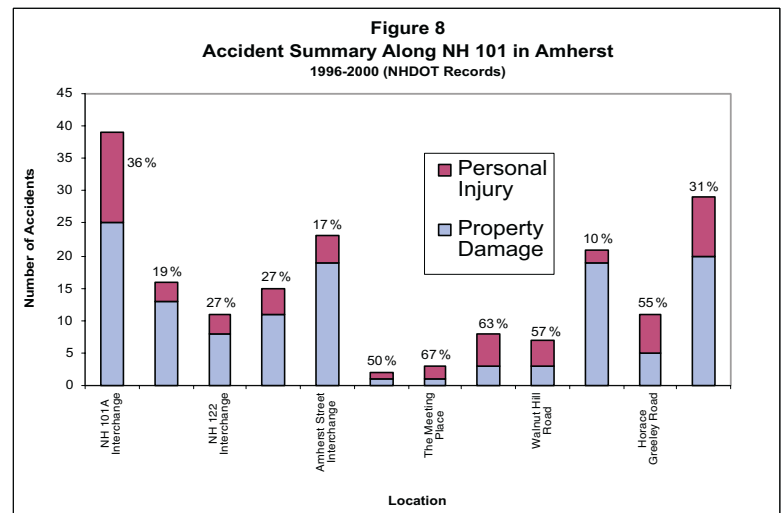
3.2 Accidents

Accident records provided by the New Hampshire Department of Transportation were reviewed and evaluated. The accident data for the towns of Amherst, Milford, and Wilton are summarized in the following paragraphs.



3.2.1 Amherst

During the five-year period of 1996 to 2000 a total of 185 accidents were reported along the Route 101 study corridor in Amherst. The Route 101A interchange recorded the highest number of accidents (39 accidents), during this period. Other high accident locations include the Amherst Street interchange (23 accidents), the NH 122 half-interchange (11 accidents), and the Horace Greeley Road intersection (11 accidents). Many of the segments of Route 101 in Amherst and some unsignalized intersections in the northern portion of Route 101 in Amherst are showing a high percentage of personal injury related accidents. In the area between Walnut Hill Road and the Amherst Street interchange the percentage of accidents involving personal injury exceeds fifty percent. Note that in 2001, which was not included in the 1996-2000 database available through the NHDOT, a fatal accident occurred on the bypass section of Route 101 near NH 122. The accident was the result of a driver drifting into oncoming traffic. The segment of Route 101 between Horace Greeley Road and the Bedford town line reported 29 accidents from 1996 to 2000. The accident data for the town of Amherst are summarized graphically in *Figure 8*.



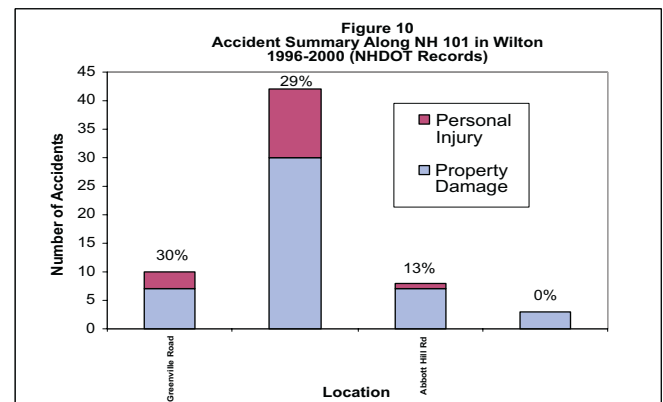
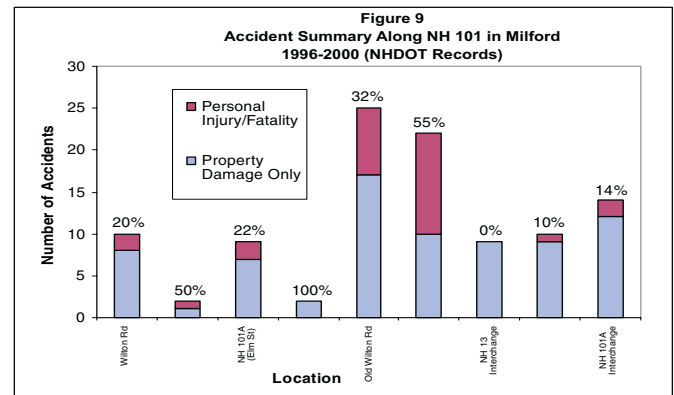
3.2.2 Milford

During the five-year period of 1996 to 2000 a total of 103 accidents were reported along the Route 101 corridor in Milford. The Old Wilton Road intersection recorded the highest number of accidents (25 accidents). Twenty-two accidents were reported on the segment of Route 101 between the Route 13 interchanges and the signalized intersection of Old Wilton Road. Fifty-five percent of these accidents involved personal injuries and/or fatalities. Three of the four fatalities recorded

occurred on this segment of Route 101. This section of the corridor is clearly deficient from a safety perspective. The accident data for the Town of Milford are summarized graphically in *Figure 9*.

3.2.3 Wilton

A total of 63 accidents were reported on Route 101 in the Town of Wilton during the five-year period of 1996-2000. The segment of Route 101 from Abbott Hill Road to Greenville Road recorded forty-two accidents. Twenty-nine percent of these accidents involved personal injuries. There were no fatalities reported during the five-year period. Roadway alignment and sight distance related deficiencies along this segment of the corridor might contribute to the relatively high number of accidents. The accident data for the Town of Wilton are summarized in *Figure 10*.



3.2.4 Public Input on Safety Issues

Most of the concerns expressed by residents at the Visioning workshops held in Amherst, Milford, and Wilton, focused on safety-related issues along the corridor

In the town of Amherst, the discussion focused in the area of recent roadway improvements. The recent improvements that were identified include the widening of Route 101 to provide left-turn lanes at Horace Greeley Road, the Town Transfer station, and the Meeting Place. A review of accident data for a six-year period (1996-2001) showed an overall decrease in the number of accidents at the upgraded intersections. Residents appreciate this level of enhanced safety created by the addition of turn-lanes on Route 101. Residents expressed a desire for additional turn-lanes to enhance safety along the corridor provided the existing shoulder is not reduced as a result of the widening.

In the town of Milford, the segment of Route 101 from the Route 13 ramps to the traffic signal at the intersection of Old Wilton Road was identified as a high accident area. At the Visioning workshop, reasons for this safety deficiency were discussed.

Possible reasons include:

- Solar glare
- Limited visibility of the queue from signal at Old Wilton Road due to the horizontal curve
- No breakdown lane
- Icing on the bridge
- High speed/passing
- Segment length

Several residents stated that because of their safety-related concerns with traveling along the bypass, they often avoid the bypass and use local roadways.

Wilton residents raised safety concerns at the intersection of Abbott Hill Road with Route 101. Recently a NHDOT construction project was completed that included the construction of left-turn storage lanes for eastbound and westbound traffic. The project also involved cutting back the hill on the south side of Route 101 to improve intersection sight distance. Residents felt that this project did not address all of the safety deficiencies at the intersection for the following reasons; the flashing yellow light was removed, more pavement on Route 101 encouraged higher speeds, and the shoulder width was reduced at the intersection. Suggested improvements to this intersection and other unsignalized intersections in Wilton included overhead signage indicating the geometry of the upcoming intersection, increased lighting for better visibility, and reinstallation of the flashing yellow caution light (at Abbott Hill Road).

3.2.5 Bypass Safety Issues

During the course of the study, officials from the town of Milford – including the Selectmen and the Chief of Police raised concerns with the number of fatal accidents that have been occurring along the Bypass. As a result, a series of meetings were held with the New Hampshire Department of Transportation (NHDOT) in an effort to better understand the problem and to develop a plan to address the problem.

This five-mile segment of Route 101, which extends into Amherst, has experienced eight fatal head-on crashes (vehicles crossing the centerline) in the last nine years. Accounting for the volume of traffic and the length of the segment, this translates into a Fatality Rate of approximately 2.4 fatal crashes per 100 million vehicle miles. By comparison, the average Fatality Rate¹ for the State of New Hampshire is 1.0 fatal crashes per 100 million vehicle miles. Not only is this segment of the corridor experiencing fatal crashes at a rate that is over two times the state average, but also all of the reported fatal crashes involve motorists crossing the centerline. In addition, nearly all of the fatal crashes occurred during daylight hours. Generally, you would expect between 30 and 40 percent of fatal accidents to occur at night. Clearly,

this is a problem of motorists crossing the centerline during the daylight hours.

We believe that the principal cause of the high fatality rate is driver inattention. In this hectic fast-paced world that we live in today, more and more motorists are driving while their attention is focused on other activities. Whether it is talking on a cell phone, drinking coffee, having lunch, or even reading and writing in their automobile, these activities divert a driver's attention. On a high speed - high volume roadway such as the Bypass, an inattentive driver can cross the centerline and collide head-on with the opposing traffic in a split second. Ironically, driver inattention along this segment of Route 101 may be related to the change in the character of the highway. Motorists traveling along Route 101 from the east in Bedford or from the west in Wilton tend to be more attentive because they have to given the turning movements that occur at numerous side streets and driveways. As motorists enter the Bypass, which is limited access with no turning movements, two things happen: first motorists tend to increase the travel speeds and second they tend to pay less attention to the roadway.

Also, some motorists may see the Bypass as their only opportunity to pass slower moving vehicles - such as trucks. However, as the volume of traffic along Route 101 continues to grow, it is becoming increasingly difficult to find safe passing opportunities. This can lead to driver frustration and to motorists taking unsafe chances.

From an operational and a safety perspective, the Bypass should be widened to a four-lane median divided highway (two lanes in each direction). In fact, as presented later in this report, a four-lane median divided section is recommended. However, given the substantial costs, widening the Bypass to a 4-lane cross-section is under the best circumstances several years away. For this reason, an effort was made to evaluate potential immediate or short-term solutions that if put in place, could enhance the safe and efficient flow of traffic along the Bypass. The following section discusses some of the various alternatives that were considered as potential solutions to address the immediate safety needs of the highway.

Alternatives Considered for Improving Bypass Safety

To enhance the safe flow of traffic in the near-term will involve a combination of driver education, police enforcement, and roadway design modifications. The following paragraphs summarize the various alternatives that were evaluated.

Alternatives that educate motorists primarily come in the form of signage. Signs can be used to alert motorists that a particular section of a roadway is a problem area and that caution should be used. Variable message boards, such as those that have recently been placed by the NHDOT serve to alert motorists and reinforce existing regulations. The existing message to "OBSERVE THE POSTED SPEED LIMIT" can be an effective method of maintaining a safe and consistent speed through the segment. Another form of signage that can be used to alert and educate motorists is a

sign that reads: “LIGHTS ON FOR SAFETY – PLEASE DRIVE COURTEOUSLY”. This type of sign, which would be placed in each direction, at the beginning and the end of the Bypass and at each interchange, would serve to not only remind motorists to be cautious, but the turned-on headlights would provide an added visual stimuli of the on-coming traffic.

The enforcement of existing speed limits and passing restrictions is also a vital component to addressing the safety problems along the Bypass. An increased visual presence of law enforcement along the Bypass would serve to alert motorists to maintain reasonable speeds and to only pass in safe and defined passing areas. Perhaps off-road “launching pads” (parking areas for police patrol vehicles) could be constructed along the Bypass at strategic locations so that police could monitor travel speeds and passing maneuvers.

It is often suggested that reducing the posted speed limit would serve to address safety deficiencies. The posted speed limit should be appropriate for the geometric conditions along the roadway and should match driver expectations. Posting the speed limit below reasonable driver expectation often results in a disparity between the high and the low speed as some motorists will continue to travel at speeds appropriate for the conditions while others will slow, respecting the speed limit. It is this type of variance in speed that can lead to serious crashes. As long as the speed limit reflects the geometric conditions of the roadway, most motorists will tend to travel at constant speed - which is a safer condition. We do not believe that reducing the posted speed limit along the Bypass would address the identified safety deficiencies. In fact, doing so could have the opposite effect.

A more effective way of reducing travel speeds for all motorists is through roadway design modifications. We have evaluated a series of physical modifications to the Bypass for their effectiveness, cost, and ease of implementation. The evaluation considered such actions as the placement of jersey barriers, rumble strips, painted medians, reflectorized delineators, and the construction of passing lanes.

The placement of a jersey barrier down the center of the Bypass would address the problem of head-on collisions. However, the barrier would require seven feet of pavement width (3 feet for the barrier and 2 feet on each side for an offset to the travel lane). Unless Route 101 can be widened (which is not a short-term solution) the needed width would have to be taken from the shoulder area, effectively reducing the 10-foot shoulder to 6 ½ feet. As motorists will tend to drift away from the barrier and closer to the shoulder, this alternative could create a potential hazardous condition, particularly at night, if an automobile were to breakdown along the shoulder. For this reason, this alternative is not recommended.

Rumble strips are grooved patterns that are placed primarily along paved shoulders to alert fatigued or distracted motorists that they are about to drift off the roadway. The use of rumble strips along roadway edges has been shown to be a very cost-

effective way of keeping motorists safely on the roadway. To a lesser degree, but increasingly, rumble strips are being used along the centerline of roadways to reduce the potential of motorists drifting into the oncoming traffic. The NHDOT has placed some centerline rumble strips along Route 101, however it is too early to determine their effectiveness. We believe that centerline rumble strips can be effective, however we would suggest that the rumble strips be placed down the center of the roadway with double yellow centerlines placed on each side of the rumble strip rather than placing the pavement markings within the strip. Doing so provides better separation and the rumble strip doesn't break up the pavement markings.

A painted 4-foot wide center median would provide the benefit of introducing some spacing to separate directional traffic while eliminating some of the problems associated with a physical barrier. The 4-foot painted center median could be put in place without widening the roadway by reducing the paved shoulder area from 10 feet to 8 feet. This option would include the placement of two rumble strips inside the painted pavement markings. To provide additional delineation, plastic delineator tubes could be placed down the center of the painted median.

This placement of the painted median would, like the jersey barrier alternative, require building up the shoulder area (the two foot width that vehicles would now be using for travel). The need to add pavement surface to the shoulder as well as the placement of new pavement markings would necessitate a one-inch overlay of the entire length of the Bypass, which would be costly. The cost to implement the 4-foot median option is estimated at approximately \$600,000.

Another option considered was the construction of passing lanes. This alternative would involve the widening of Route 101 at one location in the eastbound direction and another location in the westbound direction. Similar to truck climbing lanes they would provide an additional lane for a length of at least one half a mile. Although this option could be effective in providing motorists safe opportunities to pass, it would be expensive, as each location would likely cost several hundred thousand dollars to construct.

Action Plan for Improving Bypass Safety

Based on discussions between the NHDOT and the Town of Milford, the NHDOT has committed to the following action plan.

Immediate

1. Continue the use of variable message boards, which direct motorists to "OBSERVE THE POSTED SPEED LIMIT".
2. Install "LIGHTS ON FOR SAFETY – PLEASE DRIVE COURTEOUSLY" signs in each direction, at the beginning and end of the Bypass and at each interchange.

-
3. Review passing zones and, where appropriate, reduce the length of the passing zones and increase the length of the no-passing areas.
 4. Review location and sizing of signing and where appropriate replace.
 5. Extend the centerline rumble strip along all no-passing areas.

Short-term

The NHDOT will continue to monitor the safety conditions along the Bypass and when this segment of Route 101 is scheduled for its next pavement overlay, the Department will reconsider the option of upgrading the shoulder area so as to install either the 4-foot painted median with rumble strips or the single center rumble strip with double yellow pavement markings on either side.

In addition to these actions by the NHDOT, state and local police should increase their presence along the Bypass. Perhaps off-road “launching pads” (parking areas for police patrol vehicles) could be constructed.

3.3 Transportation Infrastructure

Route 101 is a state-maintained principal east-west highway that extends from the seacoast to Keene. As it passes through the study corridor communities of Amherst, Milford, and Wilton, the highway function varies. The bypass section, which extends from Old Wilton Road in Milford to Baboosic Lake Road in Amherst, is a limited access two-lane bi-directional undivided highway with 12-foot travel lanes and 10-foot wide paved shoulders. Full diamond interchanges are provided at Route 13 and at Baboosic Lake Road. A partial cloverleaf provides full access/egress at Route 101A, and a half diamond interchange provides westbound access/egress only at NH 122. The speed limit through the bypass section is posted at 55 mph.

The cross-sections for the remaining segments of the corridor are also two-lane bi-directional and undivided, but are characterized with business frontage, numerous curb cuts and intersecting side streets, and in western Milford – traffic signal control. In Wilton, study area intersections such as Greenville Road (NH 31 South) and Abbott Hill Road serve as residential collector roadways connecting local residential streets to the corridor. In Milford, access to Route 101 is provided at three signalized intersections where collector roads such as Wilton Road, Elm Street (Route 101A), and Old Wilton Road connect Route 101 to the Wilton town center, and residential communities north and east of Route 101 in Milford respectively. Numerous uncontrolled commercial driveways front Route 101 in Milford between the intersections of Wilton Road and Elm Street (Route 101A). The posted speed limit varies from 35 mph near signalized intersections to 50 mph in Amherst near the Bedford town line.

Nearby alternative travel routes to Route 101 include Route 101A for east/west travel from Milford to the F.E. Everett Turnpike. Route 101A is a minor arterial with daily traffic volumes ranging from 20,500 vpd west of the 101 interchange to 30,580 vpd east of the 101 interchange at the Amherst/Milford town line. Some local roads provide alternative routes to 101 in Milford. The roadway network of Armory Street and Osgood Road provide connections to local destinations in Milford. These roadways are residential collectors with low speeds, narrow pavement and stop-control at intersections. NH 122 serves as an alternative route to Route 101 in Amherst. NH 122 is a major collector with traffic volumes of 4,900 vpd south of the Route 101 interchange. NH 122 has been introduced as a safer alternative to the bypass segment of Route 101 due to the reduced speeds compared to the bypass. The nearby street system is summarized in *Table 2*.

TABLE 2
Nearby Street System

Municipality	Roadway Name	Functional Classification	Count Location	Traffic Count (vpd)	Destination
Amherst	Horace Greeley Road	Minor Collector	N of 101	2,389	New Boston, residential
	Baboosic Lake Road	Minor Collector	E of 101	2,622	Amherst, residential
	NH 122	Major Collector	S of 101	4,880	
Milford	Route 101A (Nashua Street)	Minor Arterial	E of 101 at Amherst TL	30,583	
	Route 101A (Nashua Street)	Minor Arterial	W of 101	20,497	
	NH 13 (South Street)	Minor Arterial	S of 101	11,747	
	NH 13 (South Street)	Minor Arterial	N of 101	5,385	
	Wilton Road	Local	over Souhegan River	9,288	Wilton town center
Wilton	Abbott Hill Road	Local	S of 101	1,194	residential

3.3.1 Operational Analysis: Existing Conditions

Measuring traffic volume along Route 101 indicates the importance of the corridor to the local and regional roadway system, but gives little indication of the quality of traffic flow. To measure the quality of traffic flow, key intersections were analyzed from an operational perspective. The results of this analysis provide a valid indication of how well the roadway system operates given existing and predicted travel demands.

Level of Service (LOS) is the term used to denote the different operating conditions which occur on a given roadway facility under various traffic volume loads. LOS is a qualitative measure of the effect of a number of factors including roadway geometrics, travel speed, travel delay, freedom to maneuver, and safety. Level of service provides an index to the operational qualities of a roadway segment or intersection. The evaluation criteria contained in the 2000 Highway Capacity Manual² (HCM) were used to analyze the signalized and unsignalized study area intersections.

Level of service is based on a grading system where LOS A is the best condition and LOS F is the worst condition. In general terms, intersection movements operating at

LOS A or B experience very little if any delay. Level of service C is typically considered the average delay condition. LOS D is considered to be acceptable if there is undue burden required to achieve LOS C. LOS E and F indicate that the intersection or movement being analyzed is at capacity, and that motorists experience long delays. The level of service designation is reported differently for signalized and unsignalized intersections. For signalized intersections, the analysis considers the operation of all traffic entering the intersection and the LOS designation is for the overall conditions at the intersection. The analysis criteria for unsignalized intersections are based on the expected average delay to side street movements.

The results of the signalized intersection analyses conducted for the 2001 base year reveal that each of the four intersections is currently operating under capacity during both the morning and evening peak hours. The analysis indicates relatively good operation at the intersection of Wilton Road in Milford. This intersection currently operates at LOS C during the morning and evening peak periods. The analysis of the intersections of Elm Street and Old Wilton Road indicate that during the morning peak hour, these intersections are close to capacity. Each is currently operating at LOS D with volume to capacity ratios ranging from 0.85 to 0.89. The signalized intersection of the westbound Route 101 ramp with Route 101A operates at LOS C, with little delay to through traffic. However, the nearby unsignalized eastbound Route 101 ramps with Route 101A experience delay resulting from the relatively heavy flow of traffic on Route 101A. During the morning peak period, the heavy volume on Route 101A causes the queuing of vehicles from the eastbound off-ramp back onto Route 101.

The results of the unsignalized analyses revealed poor operation (LOS F) where vehicles enter the corridor from side streets such as Greenville Road and Abbott Hill Road in Wilton, and from The Meeting Place, Walnut Hill Road, and Horace Greeley Road in Amherst. Intersection movements at the interchange ramps to Route 13 and Route 101A also reveal poor operation. However, the movements at the NH 122 and Amherst Street interchange ramps operate well (LOS A or B).

The results of the base condition intersection analyses are summarized in *Tables 3 and 4*.

TABLE 3
Signalized Intersection Capacity Analysis
2001 Base Condition

Intersection with Route 101	Weekday AM Peak Hour			Weekday PM Peak Hour		
	v/c+	Delay*	LOS**	v/c	Delay	LOS
Wilton Road	0.83	27	C	0.86	33	C
Route 101A (Elm Street)/North River Road	0.89	38	D	0.72	33	C
Old Wilton Road/Phelan Road	0.85	39	D	0.86	50	D
Route 101A WB Ramp	0.70	22	C	0.78	23	C

+ Volume to capacity ratio

* Average delay per vehicle (in seconds)

** Level of Service

TABLE 4
Unsignalized Intersection Capacity Analysis
2001 Base Condition

Intersection with Route 101	Movement	Weekday AM Peak Hour			Weekday PM Peak Hour		
		Demand ⁺	Delay [*]	LOS ^{**}	Demand	Delay	LOS
NH 31S (Greenville Road)	Left from Route 101	120	10	B	270	10	A
	Left/Right from NH 31S (Greenville Road)	285	70	F	185	161	F
NH 31N/Abbott Hill Road	EB Left from Route 101	80	9	A	60	10	B
	WB Left from Route 101	70	10	A	50	9	A
	NB Left/Thru/Right from Abbott Hill Road	145	358	F	60	88	F
	SB Left/Thru/Right from NH 31N	95	195	F	150	301	F
Route 101 WB Ramps/NH 13	Left from NH 13	105	8	A	125	8	A
	Left/Right from Route 101 WB Ramp	260	52	F	420	439	F
Route 101 EB Ramps/NH 13	Left from NH 13	85	10	A	70	9	A
	Left/Right from Route 101 EB Ramp	150	20	C	140	26	D
Route 101 WB Spur/Route 101A	Right from Route 101 WB Ramp	230	12	B	120	10	A
Route 101 EB Ramps/Route 101A	Left from Route 101A	70	14	B	160	11	B
	Left from Route 101 EB Ramp	35	478	F	45	#	F
	Right from Route 101 EB Ramp	860	577	F	520	15	B
Route 101 EB Off ramp/NH 122	Left from Route 101 EB Ramp	10	12	B	45	12	B
	Right from Route 101 EB Ramp	5	11	B	5	9	A
Route 101 WB Onramp/NH 122	Left from NH 122	5	8	A	5	8	A
	Left from Amherst Street (NH 122)	420	9	A	270	8	A
Route 101 EB Ramps/Amherst Street (NH 122)	Left/Right from Route 101 EB Ramp	20	17	C	55	13	B
	Left from Amherst Street (NH 122)	60	9	A	25	8	A
Route 101 WB Ramps/Amherst Street (NH 122)	Left/Right from Route 101 WB Ramp	240	11	B	440	14	B
	Left from Amherst Street (NH 122)	60	9	A	25	8	A
The Meeting Place Driveway	Left from Route 101	55	12	B	15	11	B
	Left from The Meeting Place Driveway	55	410	F	70	423	F
	Right from The Meeting Place Driveway	60	25	D	45	21	C
Walnut Hill Road	Left from Route 101	5	11	B	10	11	B
	Left/Right from Walnut Hill Road	65	215	F	35	113	F
Town Transfer Station ¹ ¹ Saturday 9:00-11:00AM	Left from Route 101	160	10	B	-	-	-
	Left/Right from Town Transfer Station	205	106	F	-	-	-
Horace Greeley Road	Left from Route 101	45	10	A	110	11	B
	Left/Right from Horace Greeley Road	180	278	F	110	143	F

⁺ Demand of vehicles during the peak hour
^{*} Average delay per vehicle (in seconds)
^{**} Level of Service
[#] Delay greater than 999 seconds

3.3.2 Operational Analysis: Future Volumes

To estimate future traffic volume demand, regional traffic volume models prepared by the Nashua Regional Planning Commission and the Southern New Hampshire Regional Planning Commission were examined. From the model projections for the Route 101 corridor, growth rates were determined for the towns of Amherst, Milford and Wilton. These growth rates (1.5 percent per year for Wilton and Milford, 2.0 percent per year for Amherst) were applied to the 2001 base traffic volumes to develop the 2021 future traffic volumes along the corridor. The 2021 traffic volumes are shown in *Figure 11*.

Figure 11



LEGEND
XXX AM Traffic Volumes
(XXX) PM Traffic Volumes

VANASSE HANGEN BRUSTLIN, INC.

FIGURE 11
NH 101 CORRIDOR STUDY
AMHERST, MILFORD, AND WILTON
2021 TRAFFIC VOLUMES

A level of service analysis similar to the existing condition analysis was conducted at the key study area intersections for the 2021 future traffic condition. The analysis reflects the ability of the existing roadway network to meet the projected 20-year traffic volume demands.

The results of the signalized intersection analyses show that three of the four signalized intersections (Wilton Road, Elm Street/North River Road, and Old Wilton Road/Phelan Road) would operate at or over capacity in the year 2021. The Route 101 WB Ramp/Route 101A intersection is expected to operate at an acceptable level of service (LOS C) with the planned upgrade of the intersection. The intersection improvements, which include the addition of a second left-turn lane on the Route 101A westbound approach and the provision of an exclusive right-turn lane on the Route 101A eastbound approach, will be constructed as part of a mitigation package for a recently approved retail development.

The results of the unsignalized analyses reflect poor operations for minor street approaches at all intersections with the exception of the half interchange at NH 122. Turning movements at the westbound on-ramp and eastbound off-ramp intersections with NH 122 are expected to operate at LOS C or better during both the morning and evening peak periods. All other minor street approaches to unsignalized intersections in the study area operate at poor levels of service (LOS E or F) during one or more of the weekday peak periods.

The results of the future condition intersection analyses are summarized in *Tables 5 and 6*.

TABLE 5
Signalized Intersection Capacity Analysis
2021 Future Condition

Intersection with Route 101	Weekday AM Peak Hour			Weekday PM Peak Hour		
	v/c ⁺	Delay [*]	LOS ^{**}	v/c	Delay	LOS
Wilton Road	1.09	65	E	1.15	84	F
Route 101A (Elm Street)/North River Road	1.20	101	F	0.96	51	D
Old Wilton Road/Phelan Road	1.14	100	F	1.16	125	F
Route 101 WB Ramp/Route 101A ¹	0.68	25	C	0.71	27	C

⁺ Volume to capacity ratio

^{*} Average delay per vehicle (in seconds)

^{**} Level of Service

¹ Includes retail development mitigation

In addition to evaluating the signalized and unsignalized intersections along the corridor, a key element in the evaluation of the corridor is determining the number of basic lanes that will be needed along various segments of the corridor to accommodate the future travel demands. The basic lanes of a highway are the travel lanes that are needed solely to accommodate the movement of through traffic. Basic travel lanes do not include traffic management lanes such as climbing lanes, acceleration/deceleration, weaving, and merging lanes, which may be needed in the vicinity of an

TABLE 6
Unsignalized Intersection Capacity Analysis
2021 Future Condition

Intersection with Route 101	Movement	Weekday AM Peak Hour			Weekday PM Peak Hour		
		Demand ⁺	Delay [*]	LOS ^{**}	Demand	Delay	LOS
NH 31S (Greenville Road)	Left from Route 101	160	13	B	365	12	B
	Left/Right from NH 31S (Greenville Road)	385	561	F	245	#	F
NH 31N/Abbott Hill Road	EB Left from Route 101	110	9	A	80	12	B
	WB Left from Route 101	95	12	B	65	10	A
	NB Left/Thru/Right from Abbott Hill Road	195	#	F	75	#	F
	SB Left/Thru/Right from NH 31N	125	#	F	200	#	F
Route 101 WB Ramps/NH 13	Left from NH 13	140	9	A	170	9	A
	Left/Right from Route 101 WB Ramp	350	381	F	565	#	F
Route 101 EB Ramps/NH 13	Left from NH 13	115	12	B	95	11	B
	Left/Right from Route 101 EB Ramp	205	68	F	190	159	F
Route 101 WB Spur/Route 101A	Right from Route 101 WB Ramp	310	15	C	160	11	B
Route 101 EB Ramps/Route 101A	Left from Route 101A	95	27	D	215	18	C
	Left from Route 101 EB Ramp	45	#	F	60	#	F
	Right from Route 101 EB Ramp	1160	724	F	700	42	E
Route 101 EB Off ramp/NH 122	Left from Route 101 EB Ramp	15	16	C	65	16	C
	Right from Route 101 EB Ramp	5	13	B	5	10	A
Route 101 WB Onramp/NH 122	Left from NH 122	5	9	A	5	8	A
	Left from Amherst Street (NH 122)	625	12	B	400	9	A
Route 101 EB Ramps/Amherst Street (NH 122)	Left/Right from Route 101 EB Ramp	25	43	E	80	21	C
	Left from Amherst Street (NH 122)	90	10	A	35	9	A
Route 101 WB Ramps/Amherst Street (NH 122)	Left/Right from Route 101 WB Ramp	355	15	B	650	42	E
	Left from Amherst Street (NH 122)	90	10	A	35	9	A
The Meeting Place Driveway	Left from Route 101	80	19	C	20	14	B
	Left from The Meeting Place Driveway	80	#	F	105	#	F
	Right from The Meeting Place Driveway	90	171	F	65	60	F
Walnut Hill Road	Left from Route 101	5	14	B	20	15	B
	Left/Right from Walnut Hill Road	95	#	F	50	#	F
Town Transfer Station ¹ ¹ Saturday 9:00-11:00AM	Left from Route 101	240	14	B	-	-	-
	Left/Right from Town Transfer Station	305	#	F	-	-	-
Horace Greeley Road	Left from Route 101	65	13	B	165	17	C
	Left/Right from Horace Greeley Road	285	#	F	160	#	F

⁺ Demand of vehicles during the peak hour
^{*} Average delay per vehicle (in seconds)
^{**} Level of Service
[#] Delay greater than 999 seconds

interchange to accommodate vehicles entering or exiting the highway. These basic lanes serve to provide a consistent number of lanes over a significant length of highway.

For the purpose of designing state maintained roadways, the New Hampshire Department of Transportation (NHDOT) has established LOS D as a minimum acceptable operating condition. Therefore, for the purpose of this evaluation it will be necessary to determine the number of lanes that will be needed along the corridor to obtain LOS D.

The results of an operational analysis for each of the corridor segments show that under existing conditions (2001) the segment of the corridor in Wilton operates at

LOS D, while the segments in Milford from Old Wilton Road to Route 13 and from Route 13 to Route 101A operate at LOS E. In Amherst, the segment from Route 101A to NH 122 operates at LOS D/E, the segment from NH 122 to Baboosic Lake Road operates at LOS D and the segment east of Baboosic Lake Road operates at LOS E.

Under the future year (2021), the operating condition for the entire corridor is expected to deteriorate to LOS E and LOS F. LOS E conditions are expected along the segment in Wilton, in Milford from Old Wilton Road to Route 13, and in Amherst from Route 101A to Baboosic Lake Road. LOS F conditions are expected in Milford from Route 13 to Route 101A and in Amherst east of Baboosic Lake Road.

Therefore, to accommodate the 20-year design hour volumes, the corridor will need to be widened to a four-lane cross-section. However, it is not enough to simply widen the corridor. The long-term plan for the corridor needs to meet the needs of the communities along the route.

¹ U.S. Department of Transportation National Center for Statistics (www-fars.nhtsa.dot.gov) for the year 2000.

² Highway Capacity Manual, Transportation Research Board, Washington, DC (2000)

3.2 Pedestrian and Bicycle Transportation

The Route 101 Corridor has a significant amount of bicycle use. The accompanying map shows many regional bike routes paralleling Route 101 and crossing it (primarily at overpasses and underpasses in the bypass section). Designated bike routes use Route 101 west of the 101/101A intersection in western Milford and in Amherst from Route 122/Baboosic Lake Road to Horace Greeley Road. Although no volume estimates are available, cyclists can be seen using the highway shoulders throughout the corridor, particularly on weekends. Riders can be seen on the highway shoulder in both designated and undesignated portions of the highway.

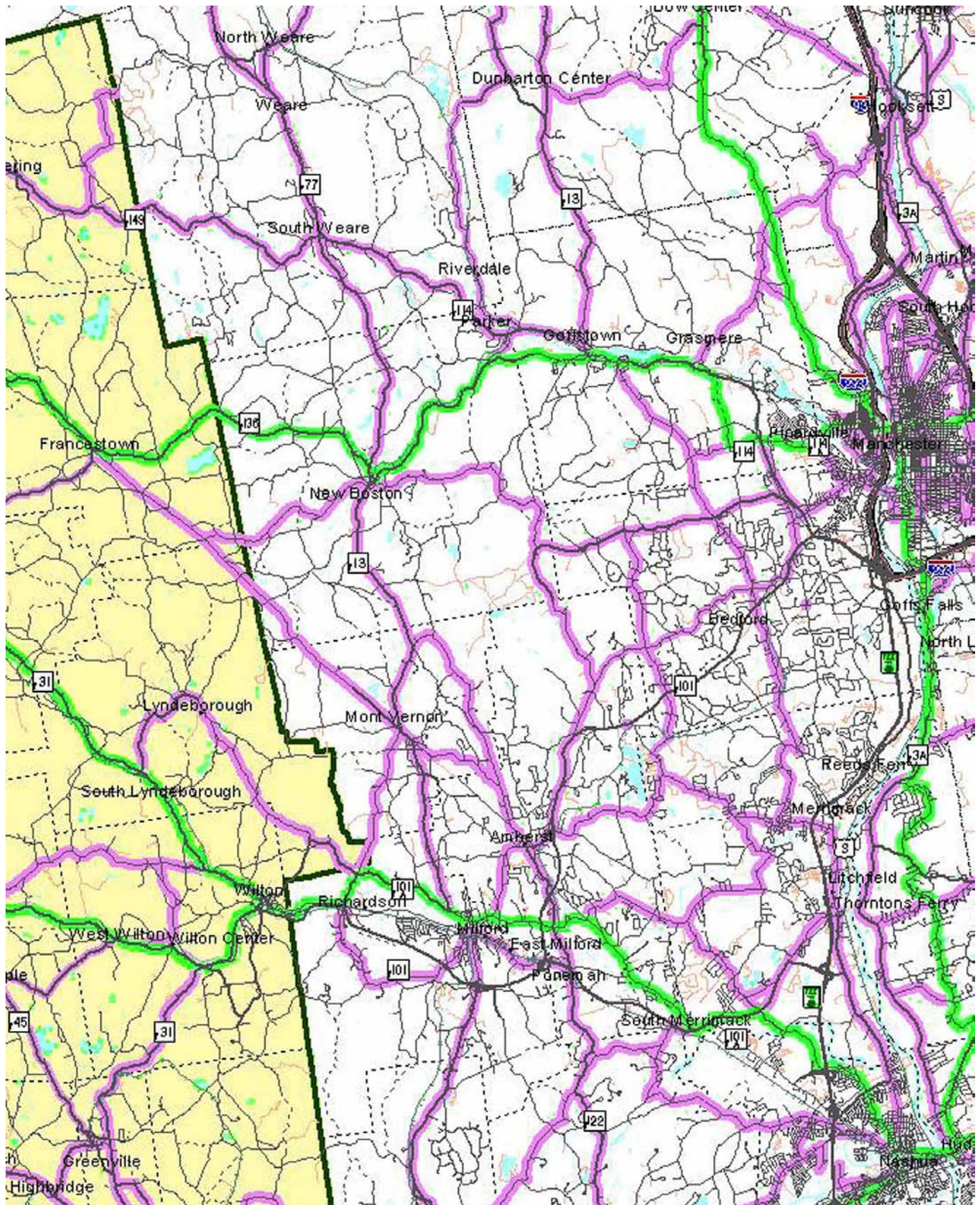
The principal infrastructure for bicyclists in the corridor is the paved highway shoulder, which is generally eight to ten feet wide, but narrows or disappears in portions of western Milford and Wilton and at some right-turn situations in Amherst. Use of the highway shoulder is legal but advisable only for experienced cyclists. On parallel and crossing routes, bicycles share the road with motor vehicles, and although vehicular speeds are generally lower on these routes, only experienced cyclists are comfortable. In Milford, segments of multi-use path have been planned; these are more suitable for children and less experienced cyclists.

There are no sidewalks along Route 101 in the corridor study area. Some pedestrians do walk on the roadway shoulder, but their number is small. Some pedestrians have also been observed crossing at the 101/101A intersection in western Milford.

A transportation study for the three towns will commence after the completion of the Route 101 Corridor Plan. This study, which is funded through a grant from the federal Transportation and Community and System Preservation Program (TCSP) will be managed by NRPC. It will consider townwide traffic issues, integration of transportation and land use, and alternative transportation modes including pedestrian, bicycle, and transit. Its recommendations will supplement those of the Route 101 Corridor Plan.

Implications for the Route 101 Corridor

The paved shoulder along the highway should be maintained for use by experienced bicyclists, and widening of the shoulder should be considered at locations where automobiles use the shoulder for right turns or where the shoulder becomes a right-turn lane.



3.3 Economic Development Profile

This report section provides a “snapshot” of the existing economic development activities (non-residential development) along Route 101 in each respective community and is not intended to be an overview of the real estate market or provide insight into potential future market trends. For a regional perspective, population, labor and employment estimates for each community are compared to Hillsborough County.

The data for the Town of Milford were collected as part of a conceptual market study for the industrial land in the BROX property and other industrial parcels. The data for Amherst and Wilton were collected to provide baseline data for the Route 101 Corridor Study.

In order to obtain data and information for the market overview, three methods were used. The first consisted of an analysis of current and historical population, labor and employment data provided by the U.S. Census and the New Hampshire Department of Employment Security. The second consisted of an estimation of square footage of non-residential properties along Route 101 via a “windshield survey”. The third included an interview with the zoning/planning official from the Town of Amherst.

3.3.1 Amherst and Wilton

The Towns of Amherst and Wilton, located approximately 20 miles south west of Manchester and 50 miles north west of Boston, have current (2000) populations of approximately 9,100 and 3,100. In terms of percentage growth, both Amherst and Wilton have experienced strong growth throughout the 1990s with increases of 19% and 20% respectively. Comparatively, Amherst and Wilton have outperformed Hillsborough County in terms of population growth by approximately 6% and 7% respectively. *Table 1* indicates a comparison of population growth for each community and Hillsborough County between 1990 and 2000.

Table 1. Population Change: 1990-2000 Town of Amherst, Wilton and Hillsborough County				
	1990	2000	# Change 90-00	% Change 90-00
Amherst	9,068	10,769	1,701	18.8%
Wilton	3,122	3,743	621	19.9%
Hills. County	336,073	380,841	44,768	13.3%
Source: U.S. Census				

Labor Force, Employment and Unemployment Conditions

According to data provided by the New Hampshire Department of Employment Security, Amherst’s labor force has experienced strong growth throughout the 1990s increasing by 875 individuals – representing an increase of 17%. Wilton’s increase in labor force was modest as compared to Amherst with

Table 2. Labor Force Change: 1991-2001 Amherst, Wilton and Hillsborough County				
	1991	2001	# Change	% Change
Amherst	5,027	5,902	875	17.4%
Wilton	1,635	1,747	112	6.9%
Hills. County	191,939	212,653	20,714	10.8%
Source: NH Department of Employment Security				

an increase of 112 individuals (7%). As shown in *Table 2*, between 1990 and 2000, Hillsborough County, although outperforming Wilton's labor force growth by approximately 4%, increased its labor force by approximately 11%, which is 6% less than Amherst's labor force growth over the same time period.

As shown in *Table 3*, Amherst has a current (2001) total employment base of approximately 5,700 jobs – which represents an increase of approximately 890 jobs (19%) since 1991. Wilton's employment base is considerably smaller with a current total of approximately 1,660 jobs and increasing by 145 jobs (10%) since 1991. Comparatively, the County outperformed Wilton in terms of percentage job growth by approximately 5% over the same time period.

Table 3. Total Employment Change: 1991-2001 Amherst, Wilton and Hillsborough County				
	1991	2001	# Change	% Change
Amherst	4,807	5,699	892	18.6%
Wilton	1,516	1,661	145	9.6%
Hills. County	178,434	204,578	26,144	14.7%

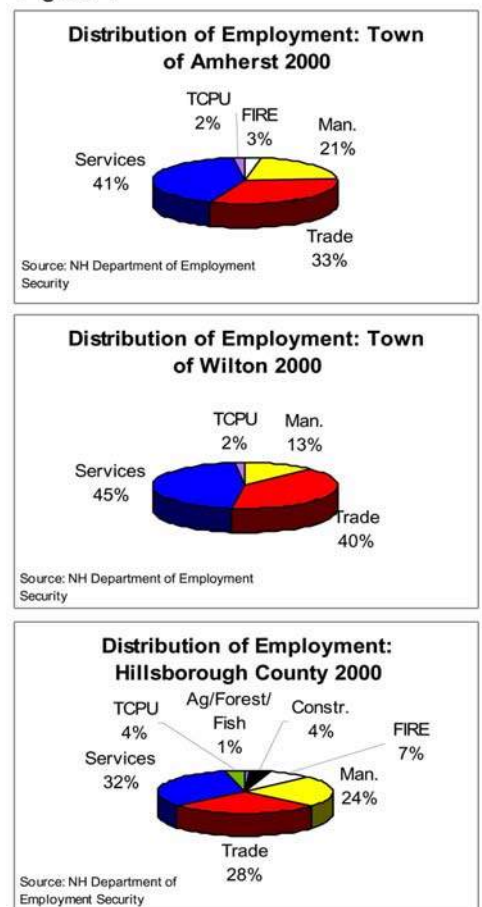
Source: NH Department of Employment Security

In terms of the current (2000) distribution of private employment in Amherst, the largest employment area is the service sector (1,240 private jobs or 41%) followed by the trade sector (971 private jobs or 31%). The manufacturing sector has a significant presence in town with over 600 jobs representing 21% of the total workforce. The transportation, communications and public utilities (TCPU) and finance, insurance and real estate (FIRE) sectors represent the smallest portion of the workforce at 2% and 3% respectively.

As with most communities, Wilton's 2000 employment base is heavily concentrated within the service (180 private jobs or 45%) and trade sectors (156 private jobs or 40%) representing approximately 85% of Wilton's total jobs. Manufacturing jobs represent approximately 13% of Wilton's employment base.

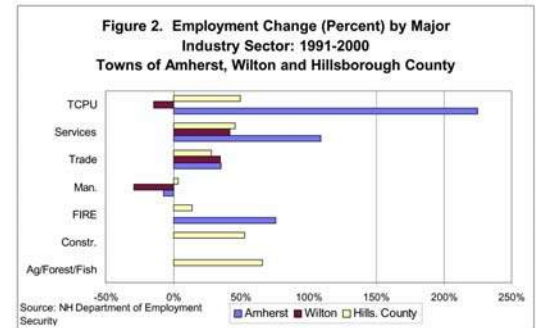
Compared to the region, Amherst and Wilton have significantly higher concentrations of jobs in the service and trade sectors (over 70% and 80%) with the region having approximately 50% of its jobs in these sectors. Manufacturing employment in the region is slightly higher than both communities with almost one in four jobs being manufacturing related. *Figure 1* indicates the distribution of employment for the Towns of Amherst, Wilton and

Figure 1



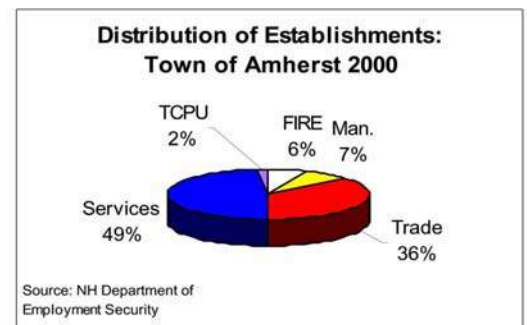
Hillsborough County (region) for 2000.

As shown in *Figure 2*, Amherst experienced significant percentage job growth in TCPU (45 jobs or 225%), service (647 jobs or 109%) and FIRE (34 jobs or 76%) sectors. Manufacturing experienced a net loss in jobs of almost 50 jobs (7%). Over the same time period, Wilton experienced net gains in service (53 jobs or 42%) and trade employment (40 jobs or 35%), while losing jobs in the manufacturing (20 jobs or 29%) and TCPU (1 job or 14%) sectors. The region experienced job growth in all sectors over the same time period.

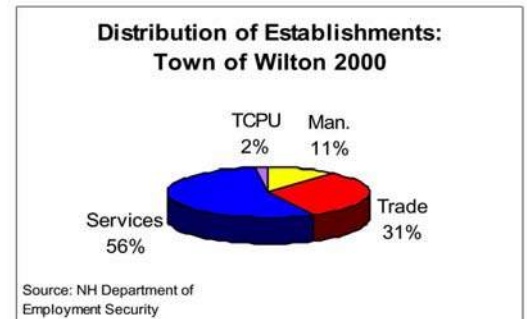


In terms of the current (2000) distribution of private business establishments, approximately half (189) of Amherst's private businesses fall within the service sector representing the largest segment of the town's establishment base. Trade and manufacturing establishments represent the second largest (142 or 36%) and third largest (29 or 7%) of the total business base. Interestingly, Amherst's significant manufacturing employment compared to its modest establishment base indicates that each of the town's manufacturing companies employ approximately 21 workers – by far the largest employment per establishment rate of any industrial sector.

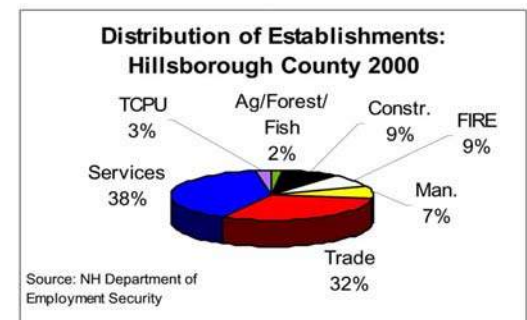
Figure 3



Currently in Wilton, 56% of the town's 54 businesses are service industry establishments with the town's 17 trade establishments comprising 31% of the total businesses.

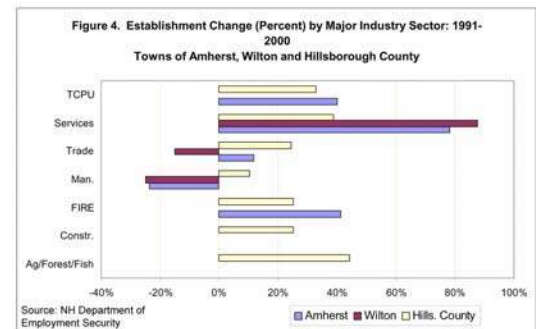


Similar to employment distribution, based on 2000 establishment information, service and trade establishments comprise a smaller amount (38% and 32%) of the total County establishment base compared to Amherst and Wilton. In terms of employment per establishment, throughout the County, each manufacturing establishment employs approximately 53 workers – more than double the next closest sector (TCPU) at 21 workers per establishment. *Figure 3* provides the distribution of busi-

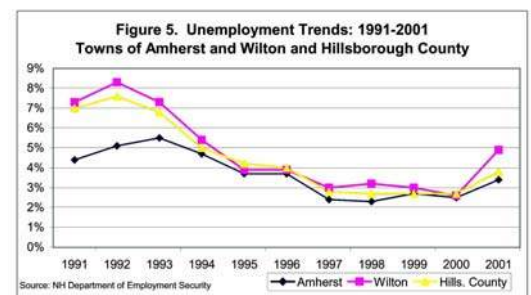


ness establishments for the Towns of Amherst and Wilton, as well as Hillsborough County.

In terms of establishment growth, between 1991 and 2000, Amherst experienced significant percentage growth in the service (83 establishments or 78%), FIRE (7 establishments or 41%) and TCPU (2 establishments or 40%) sectors. The number of manufacturing establishments declined by 9 representing a decline of 24%. With the exception of the service sector which gained 14 businesses (88%), all industry sectors in Wilton lost businesses or stayed at the same establishment level over the same time period. On a County basis, all industry sectors experienced growth with the largest percentage gains being in the agriculture, forest and fish (59 establishments or 44%) and the service (1,192 establishments or 39%) sectors. *Figure 4* shows the change in business establishments in the Towns of Amherst and Wilton and the County between 1991 and 2000.



Based on an analysis of unemployment estimates provided by the New Hampshire Department of Employment Security, the Towns of Amherst and Wilton have experienced steady declines in unemployment from the early 1990s through to 2000. Between 1991 and 2001, unemployment in Amherst and Wilton has declined by 1% and 2.4% respectively. Over the same time period, the County has outperformed both Towns with a reduction in unemployment of 3.2%. *Figure 5* indicates unemployment rate trends for Amherst, Wilton and the region between 1991 and 2001.



Current Economic Development and Site Conditions

In order to assess the economic conditions along Route 101 in Amherst and Wilton, a “windshield survey” of existing business establishments was conducted. The purpose of the survey was to inventory the types of businesses along Route 101 as well as estimate the area (square footage) of each respective establishment. Attempts were made to contact municipal officials from each community, however, only planning and zoning officials from the Town of Amherst were available to provide additional information relative to the existing site conditions of the corridor. Based on the estimated building size of each establishment, an employment multiplier¹ was applied which provides an estimate of the establishment’s total number of employees.

Route 101 through Amherst and Wilton contains mostly small service and retail establishments with most being classified as “mom and pop” (small privately owned and managed) businesses. In addition to the service and retail establishments, there are a very small number of FIRE businesses and, what appear to be, manufacturing establishments.

As shown in *Table 4*, it is estimated that the Route 101 through Amherst contains approximately 31,900 SF (28 businesses) of non-residential development which is primarily concentrated in service and retail establishments. The 28 businesses along Route 101 represent approximately 7% of Amherst’s establishment base. When an employment multiplier is applied to each land use, it is estimated that 116 individuals work in these respective establishments – representing 2% of Amherst’s total employment. As the applied employment multiplier periodically over/underestimates typical employment within certain establishments, an adjusted (sensitized) employment estimate of approximately 96 jobs is provided – representing 1.7% of Amherst’s total employment base. Although not within the study area, it is estimated that Route 101A in Amherst contains majority of the town’s employment and establishment base.

Route 101 through Wilton contains approximately 49,000 SF (14 businesses) of non-residential development which is concentrated in the manufacturing and service establishments. It should be noted that one manufacturing business (Label Art) is estimated to comprise over half of the manufacturing space along Route 101 in Wilton. The 14 businesses along Route 101 in Wilton represent approximately 26% of the town’s establishment base. In terms of employment, these establishments employ an estimated 107 workers which represent approximately 7% of Wilton’s employment base. An adjusted Route 101 employment estimate ranging from 81 (5% of employment base) to 271 (16% of employment base) has been provided. It should be noted that the 271 jobs estimate includes 215 workers (provided by the New Hampshire Department of Employment Security) from Label Art which likely includes workers from other Label Art locations. It is likely that an

Table 4. Summary of Economic Conditions: 2002 - Route 101			
Towns of Amherst and Wilton			
Amherst			
Establishment Type	Estimated SF	Estimated Employment	Adjusted Employment
Service	13,200	36.0	36.0
Retail	11,950	60.7	39.5
FIRE	5,500	15.8	16.0
Other	1,200	3.5	4.0
Total	31,850	116.0	95.5
Estimated Total Town Employment 2001		5,699	5,699
% Employment on Route 101		2.0%	1.7%
Estimated Total Town Establishments 2000		391	391
Estimated Occupied Establishments on Route 101		28	28
% Establishments on Route 101		7.2%	7.2%
Wilton			
Establishment Type	Estimated SF	Estimated Employment	Adjusted Employment
Service	19,500	23.7	15.0
Retail	10,500	53.3	27.0
Manufacturing	18,700	30.1	39 to 229*
Total	48,700	107.1	81 to 271
Estimated Total Town Employment 2001		1,661	1,661
% Employment on Route 101		6.5%	4.9% to 16.3%*
Estimated Total Town Establishments 2000		54	54
Estimated Occupied Establishments on Route 101		14	14
% Establishments on Route 101		25.9%	25.9%
*Note: Includes employment estimate (215) for Label Art which may include employees at other locations.			
Source: Gruen, Gruen Associates and RKG Associates, Inc.			

adjusted employment range between 80 and 100 jobs would be realistic. As with Amherst, it is estimated that 101A through Wilton contains most of the town's employment and establishment base.

Conclusions: Amherst and Wilton

The following points are most relevant relative to the economic development conditions found along Route 101 through the Towns of Amherst and Wilton:

- Amherst and Wilton have experienced strong population growth throughout the 1990s;
- The majority of the employment and establishment base in each community involves the service and trade sectors;
- Between 1991 and 2000, Wilton has experienced a net loss of manufacturing and TCPU jobs;
- It is estimated that employment in establishments along Route 101 in Amherst represents approximately 2% of the town's employment base while the Wilton section of Route 101 represents approximately 5% to 7% of the employment base.
- In terms of businesses, Route 101 through Amherst represents approximately 7% of the town's establishment base while Route 101 through Wilton represents approximately one quarter of the town's establishment base.

3.3.2 Milford

This section contains excerpts of the *Non-Residential Market Study for the BROX Property* by RKG Associates, Inc., which is Appendix C to this report. See the appendix for footnotes, figures, and more information.

Population and Household Trends and Projections

Since 1980, population in the Town of Milford has increased by more than 4,930, to a base of 13,618 persons in 2001. The increase during the 1990s (1,820) was almost half the size of the increase during the 1980s (3,110). The average annual growth rate between 1980 and 2001 was roughly 2.7% in Milford, and only 1.4% per year during the 1990s. Population in Hillsborough County also increased between 1980 and 2001, but at a somewhat slower rate as indicated by an average annual increase of 1.9%.

Labor Force and Unemployment Trends

Between 1990 and 2001 the resident labor force in the Town of Milford increased by more than 320 participants, or 4.5%. This finding suggests that only 17.6% of the new persons (1,820 persons) in Milford were labor force participants, while the other 82.4% were non-participants, such as children, non-working household mem-

bers, or retirees. In Hillsborough County the labor force increased at a faster percentage rate, 6.0% between 1990 and 2001, than in Milford, suggesting a higher growth in labor force participants in the rest of the County. The growth rate in the labor force in the Nashua PMSA at 4.5% was similar to that in Milford, but less than half the growth rate indicated for the State. By comparison the growth rate in the Manchester PMSA was 7.2%, higher than indicated for the Nashua PMSA and Milford, indicating that this area is benefiting from a greater increase in labor force participants.

Conclusions The labor force in Milford has increased at a much slower rate than population growth since 1990. In fact, only 17.5% of the population increases were labor force participants. In addition, the number of employed persons increased as the unemployment rate declined in the latter half of the 1990s. However, a softening in the economy in the early 2000s has resulted in a recent up-tick in the unemployment rate. The unemployment rate in Milford, however, is traditionally lower than other areas, suggesting a more stable labor force.

Business Trends

In 1998, Milford had 390 operating businesses, reflecting a gain of 179 firms since 1980, when there were 211 businesses operating in the town. This indicates an 84.8% gain, or an average of more than 4.2% per year. However, the number of businesses declined by 8 firms in the last two years. As noted, the town experienced a higher percentage of growth in new businesses during the 1980s than in the 1990s. The average annual growth rate was 5.8% in the 1980s, but only 1.7% per year in the 1990s. In addition, 93.3% of all new businesses since 1980 are classified as non-manufacturing firms. This trend was similarly observed at the county and state levels.

In Milford, firms in the services industry experienced the most growth between 1980 and 2000, followed by gains in retail businesses. In 2000, firms in these two sectors represent 64% of all businesses operating in Milford. Increases were also experienced in the wholesale trade, manufacturing and construction sectors. In fact, gains were evident in the number of businesses across all industry sectors during the twenty-year period. These increases appear fairly consistent with changes observed in the two surrounding PMSAs.

Conclusions Milford has enjoyed a gain of roughly 170 operating businesses between 1980 and 2000. Nearly 93.6% of this growth occurred in non-manufacturing businesses, with businesses in the services and retail sector experiencing the most growth during the twenty-year period. Some growth, albeit small, did occur in the manufacturing sector, which experienced more growth in businesses during the 1990s than in the 1980s. This latter finding counters the trend in the manufacturing sector in the Nashua PMSA, where nominal growth in manufacturing businesses occurred in the 1990s. In fact, Milford captured nearly 36% of the growth

in manufacturing firms in the Nashua PMSA during the 1990s, which is nearly four times its representation (9.3%) in 2000. This is a significant finding in light of the decline in manufacturing employment as discussed below, and beneficial for the planning of a proposed business park. It also suggests that manufacturing businesses are locating in Milford, despite it being somewhat removed from the interstate highway network.

Employment Trends

Total employment in the Town of Milford increased by 3,440 jobs (from 3,420 in 1980 to 6,860 in 1999, the peak of the twenty year period) indicating a 100.4% gain. Employment in Milford declined by nearly 800 jobs in 2000, to a level of roughly 6,080 jobs. Between 1980 and 1989, employment rose by nearly 1,870 jobs, representing an annual growth rate of 6.0% during the 1980s. Then, employment levels declined to a low of 4,610 jobs in 1991, and subsequently recovered over the next three years, such that employment in 1994 surpassed the previous high mark in 1989. Over the next five years, employment increased by another 1,590 jobs, indicating a 6% average growth rate between 1994 and 1999. A decline of -11.5% occurred between 1999 and 2000, such that the average growth rate since 1994 was only 2.5%. Therefore, between 1980 and 2000, private employment in Milford increased by 2,650 jobs, denoting an annual growth rate of 3.9%. More importantly, 21.7% of the jobs were in manufacturing companies, as this sector experienced a gain of 575 positions, or 27.9%, during this twenty-year period. Manufacturing employment reached a peak in 1984 at 2,570 jobs, and then declined to its nadir of 1,660 jobs in 1992. In 1998, manufacturing jobs recovered to its previous benchmark, and by 2000 surpassed that level by only 62 jobs. In other words, the amount of manufacturing jobs in 2000 is only 2.4% higher than the prior peak sixteen years earlier in 1984. In spite of these low trends, Milford experienced a higher growth rate in manufacturing jobs over the last twenty years than Hillsborough County or the State.

Between 1980 and 2000 employment in the retail sector in Milford experienced the most growth as evidenced by an increase of more than 1,100 jobs during the 20-year period. As illustrated, only 23.3% of this growth in retail employment occurred in the 1990s, similar to trends in the services sector. In comparison, employment in the manufacturing-durable goods sector experienced a gain of roughly 800 jobs during the twenty-year period, and all of it occurred in the 1990s. Employment gains were also evident in the FIRE, TCPU, wholesale trade and construction sectors. In total, jobs increased by nearly 430, offsetting losses in the non-durable manufacturing goods sector.

While Milford enjoyed both new business and employment growth during the last twenty years, the average number of workers per firm (business) declined in nearly all industry sectors. As illustrated, the average employment at firms in the non-durable goods sector was smaller in 2000 than in 1980, dropping from roughly 62

jobs per firm to nearly 34 jobs per firm in 2000. Also, average employment at firms in the durable goods sector declined from nearly 60 in 1980 to an average of 44 in 2000. The average employment per firm in the other industries was below 16 persons per firm, ranging from a high of 16 in the TCPU sector, to a low of nearly 7 in the construction industry.

Conclusions In 2000, employment in Milford remained about 800 jobs below the previous high benchmark of nearly 6,900 jobs established in 1999. In the twenty-year period between 1980 and 2000, Milford has experienced an increase of roughly 2,650 jobs, or a 77.3% gain in its employment base. This suggests an average growth rate of 3.9% per year during this time frame. However, more job growth occurred during the 1980s than in the 1990s. Unlike the trends in the Nashua PMSA, Milford has enjoyed an increase in its manufacturing base, which accounted for 43.3% of total employment in Milford for 2000. This suggests that the local area has been able to retain and/or attract a higher percentage of manufacturers than the region as a whole. Employment in the services and retail sectors have also enjoyed gains, as well as all the other major industrial sectors. Historical trends also indicated that the average number of workers per firm has been declining over the last twenty years, which, from a real estate perspective, suggests less building space and land areas will be needed to support new and existing businesses.

Property Type

Roughly 49% of Milford's employment base in 2000 was in businesses that utilize industrial-type buildings. Employment in primary metal industries accounted for nearly 31% of these jobs followed by jobs in the instrument and related products, other manufactures, and electronic equipment sectors. Printing and publishing jobs, and industrial machinery jobs accounted for another 6%, each, followed by jobs in the industrial machinery and equipment sector, wholesale trade sector, and the stone, clay and glass products sector. As exhibited, ten sectors of the twelve are forecasted to experience growth in the short term.

Conclusions Milford has a strong and diversified employment base and nearly all the indigenous industries are in those sectors that are forecasted to experience job growth over the short term. Nearly 50% of the Milford's employment base utilizes industrial type properties, while another 28% occupy retail type buildings and another 18% of the base is services oriented and would utilize office type buildings. Future employment demand would be more oriented to office or "flexible" space (a hybrid of office and industrial), since 62.5% of the job growth is forecasted in services oriented business, and the remaining 38% fairly evenly divided between industrial and retail type employment.

1 Gruen, Gruen and Associates, *Employment and Parking in Suburban Business Parks: A Pilot Study* (Washington D.C.: Urban Land Institute, 1986) has been used which is considered an industry standard for determining employee density by land use/ workspace.

3.4 Land Use and Development Regulation

Land use along the Route 101 Corridor is a key issue. The type and amount of development along the highway affects the demand for access to and from Route 101, and this in turn has a significant effect on traffic flow and safety. Development also affects the character of the Corridor and thus the quality of life in the towns through which it passes.

3.4.1 Amherst

Land Use

Development has more impact on the Route 101 Corridor north and east of the town center where access to abutting parcels is from the highway. In the limited access bypass section, access is an issue only at interchanges.

Along the section of Route 101 north and east of the Route 122/Baboosic Lake Road interchange which provides access to Amherst's town center, land is predominantly agricultural, very low density residential, or vacant. Access demands are focused at a small number of commercial driveways and at the intersections of side streets serving residential land use. The visual character of this area of the Corridor in Amherst is rural and open.

There are small areas of commercial land use and the town solid waste transfer facility along this portion of highway. Principal commercial land uses are the Salzburg Square and the Meeting Place complexes, along with smaller stand-alone businesses like the Black Forest. Small-scale professional offices are located just off the highway along Limbo Lane adjacent to the first interchange. An undeveloped site at the end of Limbo Lane has access to Route 101 opposite the entrance to the Meeting Place. In general, these commercial uses are generally perceived as positive in Amherst, and little future commercial development is foreseen.

South of the Route 122 interchange at the northern end of the bypass section of Route 101, land is either vacant or in residential use with houses set well back from the highway. With few exceptions these houses are invisible from the driver's point of view, although traffic noise may be audible from some residences. Because the highway is grade-separated from town roads with either interchanges or overpasses where they cross, there is little direct connection between these Amherst land uses and Route 101, with the important exception of traffic that diverts from the highway via residential areas.

Amherst's town center is located approximately one mile west of the northern-most interchange on the bypass Section of Route 101. A large area of commercial and industrial use lies along Route 101A in the southern portion of Amherst.

Zoning

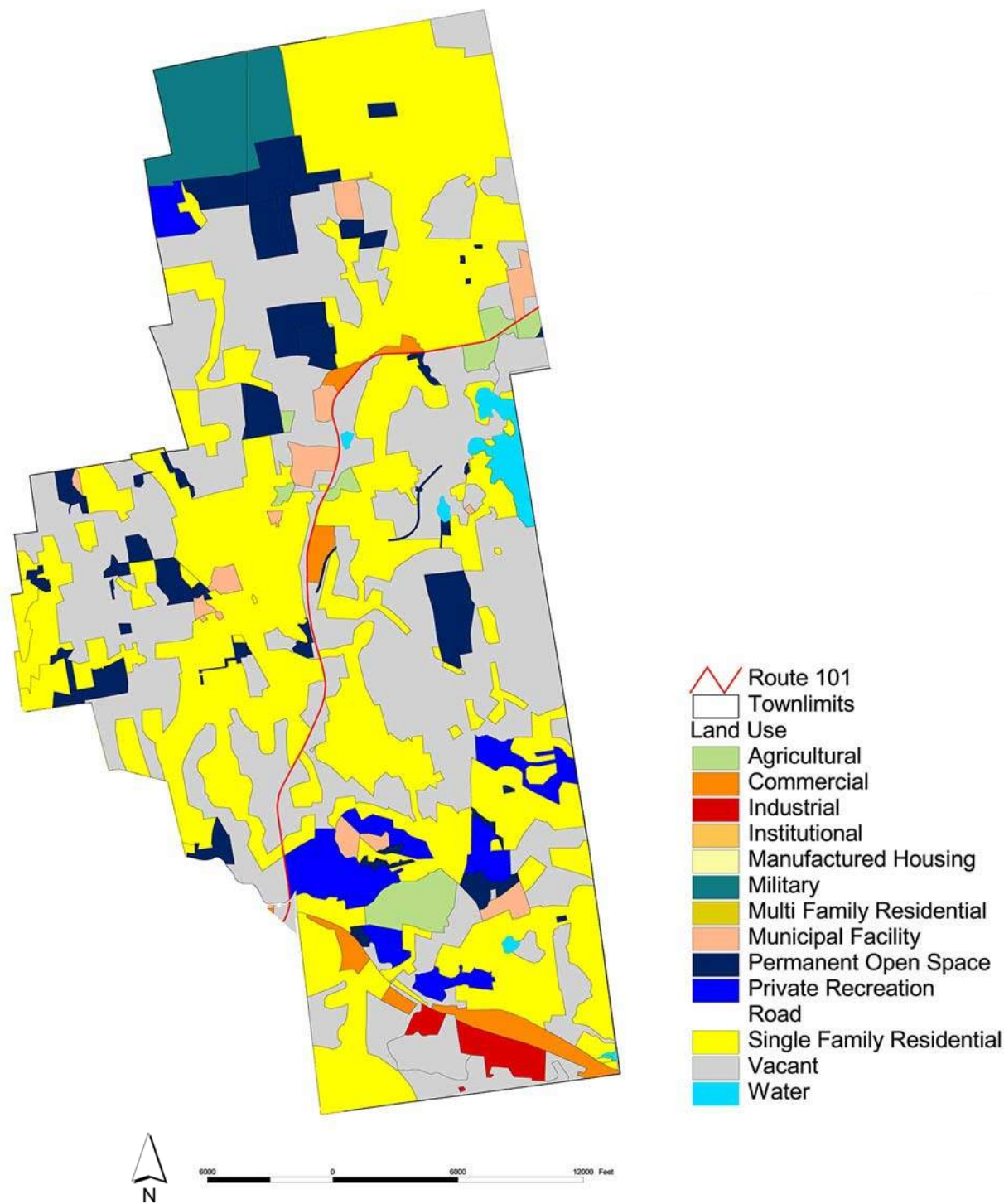
Most land in Amherst is zoned for low density rural residential use in districts designated “Residential Rural” (2 acres non-wetland per dwelling), “Northern Rural” (5 acres non-wetland per dwelling), and “Northern Transitional” (3.5 acres non-wetland per dwelling). These three districts account for most of the land fronting on the portion of Route 101 north and east of the Town Center, which is in a Historic district. A small Limited Commercial District comprises the Salzburg Square Development. The LC district requires a 100’ setback from Route 101, which is a designated scenic road; maximum site coverage is 20 percent and 30 percent of the site must be kept in open space. Non-residential development is subject to site plan review. A small General Office district adjacent to the highway near the town center comprises small-scale professional offices. Little or no future non-residential development is foreseen along Route 101, and it is reportedly unlikely that the Town will ever enact additional non-residential zones in this area.

As noted above, the major commercial and industrial areas of Amherst are in along Route 101A in the southern part of town, within large Commercial and Industrial zoning districts and a small General Office district.

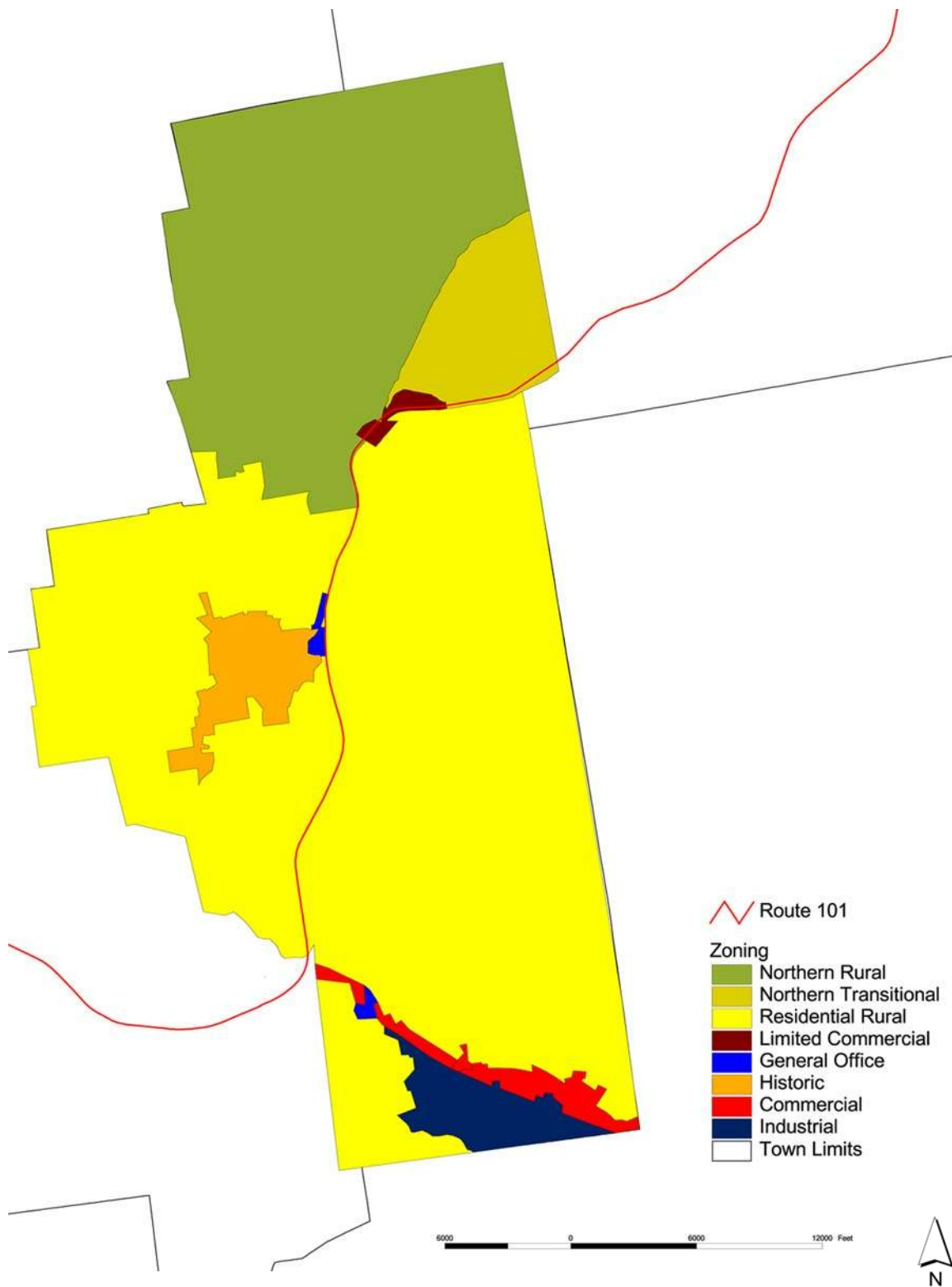
Issues and Opportunities

The land uses along the Route 101 Corridor in Amherst do not strongly affect operations and safety, and their overall character is positive. The Corridor Study should address specific access points, such as the entrance to the Meeting Place, where a parcel in the General Office district on the north side of Route 101 may be developed and its access coordinated with access for the Meeting Place.

Land Use Map: Amherst



Zoning Map: Amherst



3.4.2 Milford

Land Use

In Milford, the limited-access bypass section of Route 101 continues through much of the town, making a transition to direct access for abutting parcels north of the Old Wilton Road traffic signal.

Along the limited access section, land use near the highway is primarily vacant with some low density residential development set well back from the highway, limiting its exposure to the highway. Route 101A is a major regional commercial and industrial land use corridor, which has a full interchange with Route 101 near the eastern edge of Milford. A concentration of commercial development in two shopping malls adjacent to the interchange places significant demand for access on Route 101A, and this in turn affects the flow of traffic at the interchange ramps. Route 13 is a second interchange with several industrial and commercial uses, which can be glimpsed from the highway but do not appear to interact significantly with the operation of the interchange and Route 101 itself.

The BROX property is a 313-acre tract of land acquired by the Town in 1999. Approximately 123 acres in the northern part of the property, through which the highway passes, is zoned industrial and designated for light industrial development; this proposed development and its relationship to surrounding land uses and access are discussed in an Appendix to this report. The southern portion of the property includes a new elementary school, with the remainder being reserved for future Town needs.

After passing through the BROX property and overpassing its unpaved service road which connects to Old Wilton Road via Perry Road, Route 101 curves to the north and descends to a signalized intersection at Old Wilton Road. The area from this intersection to the Route 101/101A intersection is a major industrial land use area of Milford, with an active commercial node which includes a Market Basket supermarket and Granite Bank. The industrial area has several subareas. An older industrial area extends east between Old Wilton Road and Route 101A. The Meadowbrook light industrial subdivision lies to the west with access to Route 101 via Phelan Road. A large modern industrial building of the Hitchener Manufacturing Company (which also has a large facility in the area along Route 101A) also has access to Route 101 via Phelan Road.

West of the 101/101A intersection, land is constrained between an active railroad line to the south and Route 101 and the Souhegan River to the north. In this area there is a strip of businesses which are generally automobile-oriented, including service stations, convenience stores, and auto repair businesses. These businesses have highly constrained sites, particularly at the end closest to the 101/101A intersection. Many have poorly defined access, although some recent improvements have been made at Silva Mart, and access to and from Route 101 is a significant

issue. Continuing west into Wilton is the signalized intersection at Wilton Road where there is a Bank of New Hampshire branch office and a site on which an Irving convenience store/gas station is proposed.

Milford's town center, the Oval, is located on Route 101A approximately 2 miles northwest of the easternmost Route 101A interchange and approximately 3 miles east of the signalized 101/101A intersection.

Zoning

The largest portion of Milford is in the Residence "R" district, including the southern and southwestern parts of town; this district adjoins the south side of Route 101 between the BROX property and Osgood Road and also east of Route 13. The central residential portion of Milford lies in the single-family Residence "A" district (15,000 square foot minimum with municipal services, 40,000 square feet without both sewer and water) and the single and multiple family Residence "B" district (20,000/60,000 square foot minimum lot size depending on services); the "A" and "B" districts adjoin the north side of Route 101 and a portion of the south side of the highway between Brookside and Osgood Roads.

At the Route 101A and Route 13 interchanges land is zoned both Commercial (C) and Integrated Commercial-Industrial (ICI). The Commercial district permits a wide range of retail, restaurant, office, and automobile-oriented uses. It requires 20,000/60,000 square foot minimum lot size depending on the presence of municipal services, has a 30-foot front setback and requires 30% open space on site. The ICI district permits commercial uses as well as distribution, light manufacturing, and research & development uses. ICI requires 20,000/40,000 square foot minimum lot size depending on availability of municipal services, and has 30 foot front setback and 30% required open space.

The ICI district also occurs along Route 101A west of central Milford, including the Market Basket site near the 101/101A intersection and also the area between the highway and Wilton Road at the western edge of Milford. The constrained commercial strip west of the 101/101A intersection is in the Commercial district.

The remainder of the western Milford area adjoining Route 101 is in the Industrial District. This district allows light manufacturing, processing and warehousing, distribution, research & development, and large (over 15,000 square foot) office buildings. Commercial or residential uses are not allowed.

Milford addresses Aquifer Protection, Wetlands, and Floodplains through overlay districts.

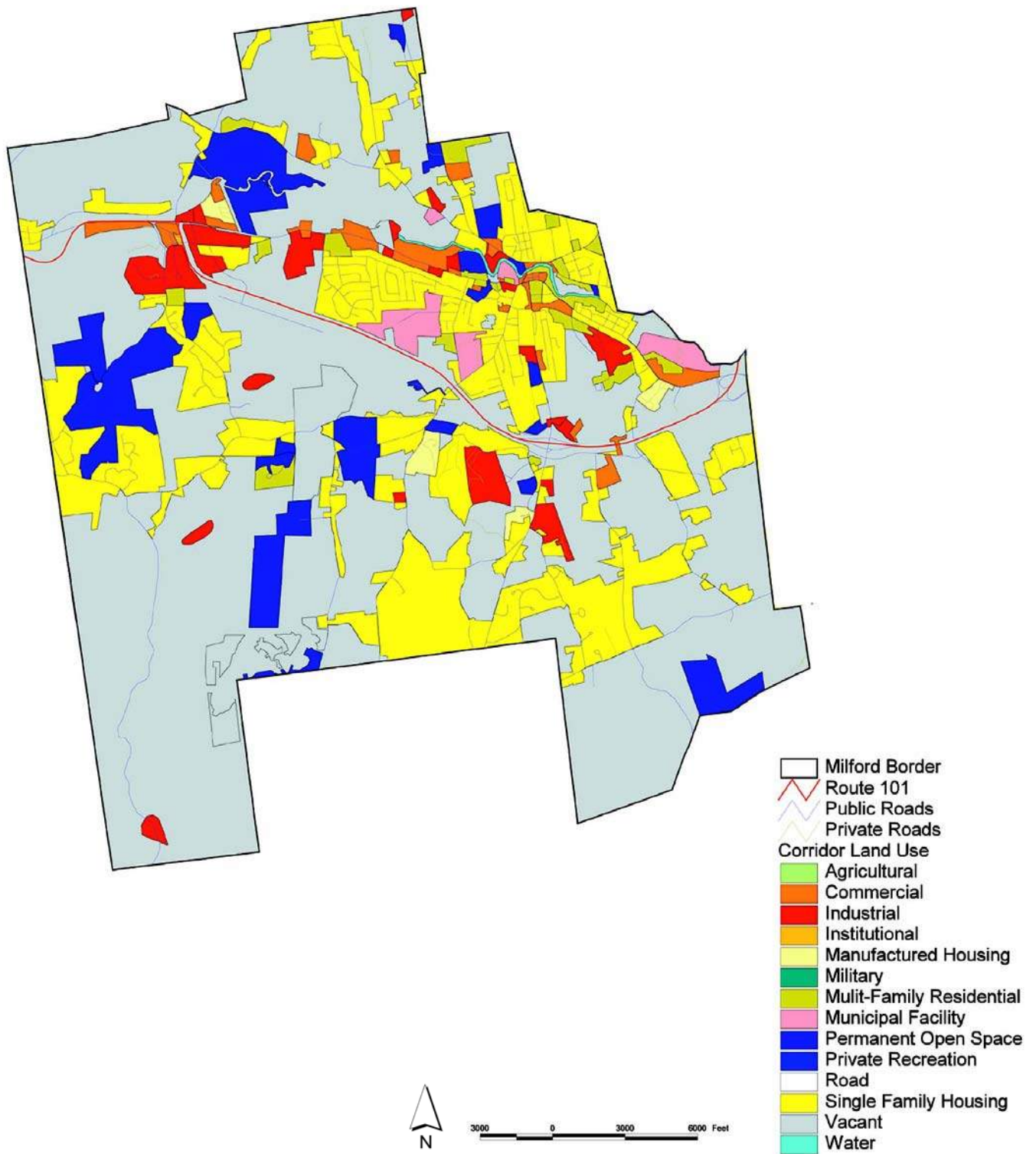
Milford has detailed Site Plan Review regulations for non-residential development. The regulations provide for design review and assessment of impacts to public ser-

vices and the natural environment. Architectural review is required at the Planning Board's discretion. The regulations address in detail landscaping, parking layout, driveways, erosion and sediment control.

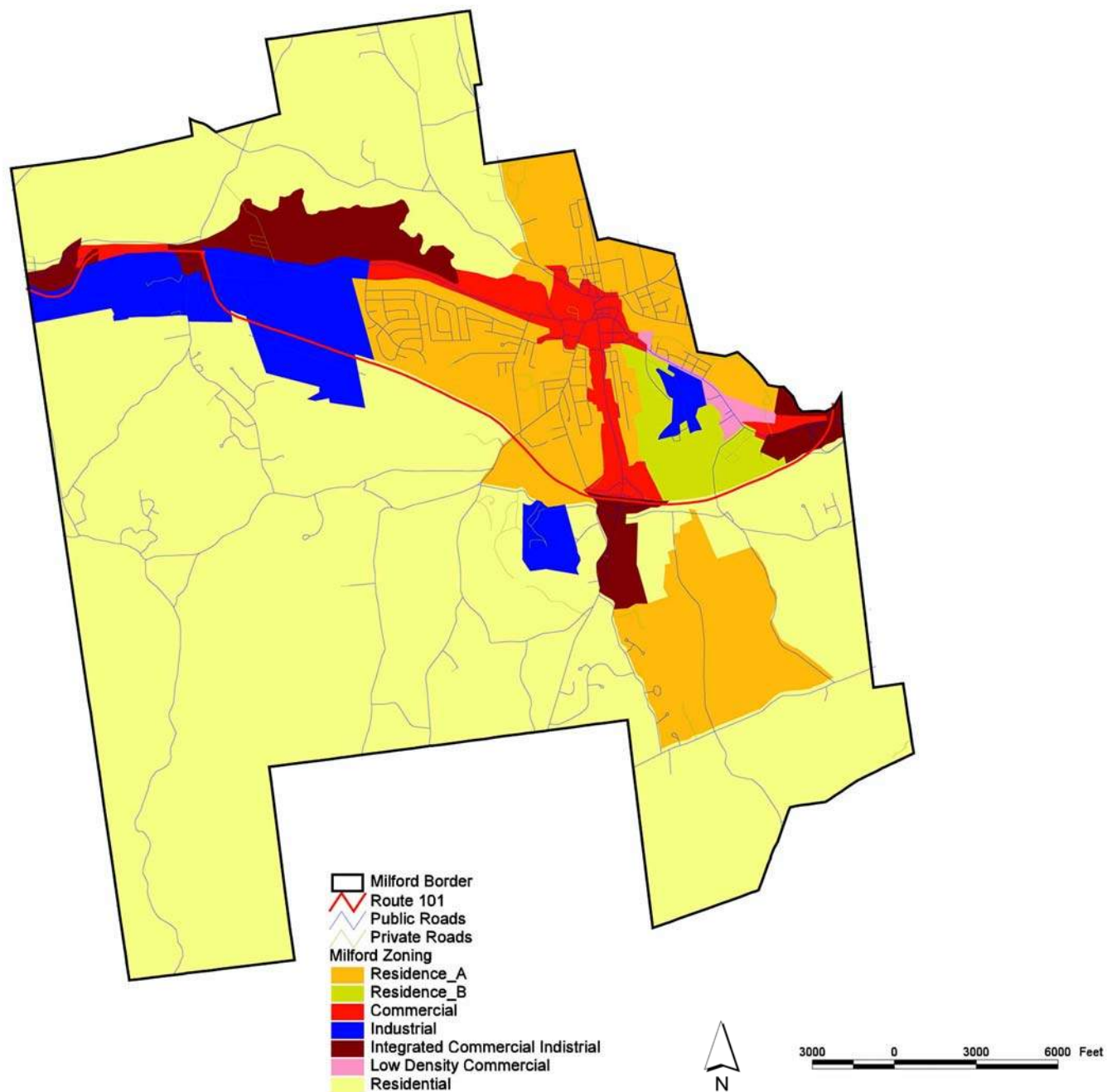
Issues and Opportunities

Land use issues affecting the Route 101 Corridor in Milford occur primarily in the western part of the Corridor. Access to the BROX industrial property is a significant issue to be coordinated with highway improvements; this and other BROX development issues are discussed below in an Appendix to this report, but the size of the BROX development makes it important for all development issues in the western Milford area to be coordinated. The commercial strip just west of the 101/101A intersection is also a key development issue. Better access management is crucial to the future operations and safety along this stretch of Route 101, and there are opportunities to upgrade the appearance and value of the commercial properties through better design. While guidelines for redevelopment would not have immediate effect, there is potential for the gradual redevelopment and upgrading of parcels in this area in response to market forces and roadway improvements that make traffic in this area more manageable. The key challenge in this commercial strip is the small parcel size, particularly the depth of parcels between the highway in front and the railroad track in the rear. Milford's zoning and development controls are already well-conceived, and improvements to address development at BROX and the larger commercial/industrial area would best be in the form of specific guidelines for the town-owned BROX property.

Land Use Map: Milford



Zoning Map: Milford



3.4.3 Wilton

Land Use

Wilton's downtown is an attractive mixed use area which lies just north of Route 101 on the north side of the Souhegan River near the eastern edge of town. Route 101 continues past the Wilton Road intersection in Milford, around a sweeping bend and into the Town of Wilton. The highway passes to the north of modern multifamily housing in western Milford and follows the base of Abbott Hill, which has many single-family residences located at higher elevations. Because of the topography, there is no visual connection between these homes and the highway, but access is a problem for many residents, particularly at the entrance to Abbott Hill Acres whose intersection with Route 101 has poor sight lines and a steep approach grade. Recent improvements were made at the nearby Abbott Hill Road intersection, which provides additional access to this residential area and the south-east part of Wilton.

Route 101 continues past Abbott Hill to largely open flat land along the Souhegan River, which the highway crosses just before Intervale Road. This area includes widely separated commercial uses including two garden centers (Bursey's and the House by the Side of the Road) which are seasonally busy and generate heavy demands for both access and roadside parking. There is also a convenience store, a truck-oriented business, and the Monadnock Spring Water Company. Several residences are also located near Route 101. Some conversion of houses to retail use has occurred and may occur in the future. The Corridor Study Area ends as Route 101 curves to the north toward Isaac Frye Highway and Wilton Center, and Route 31 diverges to the south.

Zoning

Most of Wilton is in the low density Residential-Agricultural district (1 to 2 acres acre minimum per single family residence, depending on soil type). The more moderate density Residential district (half-acre/1acre depending on availability of municipal sewer and water services) comprises downtown Wilton, much of Abbott Hill, and an area west of downtown along Greenville Road (Route 31 north). The multi-family housing noted above is in the Residential-Agricultural district. Large Industrial districts are located between Route 101 and downtown Wilton, on the north side of Route 101 west of its crossing of the Souhegan River, and on both sides of the highway near the divergence of Route 31 south. Outside the Corridor Study Area there is more industrially zoned land along Route 101 west of Route 31, along Route 31 south, and along Route 31 in the northern part of town.

Commercial districts are located along Wilton Road in the downtown, and between Route 101 and the Souhegan River west of the highway's crossing of the river. A small Commercial district is also located at the divergence of Route 31 south.

Wilton's zoning permits residential uses in the Commercial District and commercial uses in the Industrial district. Permitted uses in these districts are broad, including all types of restaurant, retail, office, and entertainment uses as well as automobile-oriented uses in the Commercial district and a broad range of uses in the Industrial district. Maximum lot coverage in the Commercial district is 75 percent, with uses pre-dating March 1990 grandfathered from this requirement, although impervious cover may not be increased; maximum coverage in the Industrial district is 60 percent. Front setbacks of 35 feet, minimum, are required with no parking permitted in the front setback but allowed between the setback and the front of the building. Parking is permitted up to 10 feet from side and rear lot lines where the abutting parcel is commercial or industrial, and shared parking between adjacent commercial or industrial parcels is permitted with no setback.

There are special access provisions for commercial lots fronting on Route 101. Access for such lots must be from a side street if available rather than directly from the highway. In addition, for such lots,

“provisions shall be made during the site plan review process for the layout and construction of streets or side roads as the Planning board shall determine necessary to permit travel between adjacent lots without accessing Route 101. To encourage shared lot access, where at all possible and practical, the location of all accessory street or roadway curb cuts shall be situated to allow adjacent lots to also take advantage of or share the same point of access along the street or highway.” (Section 7.2.4)

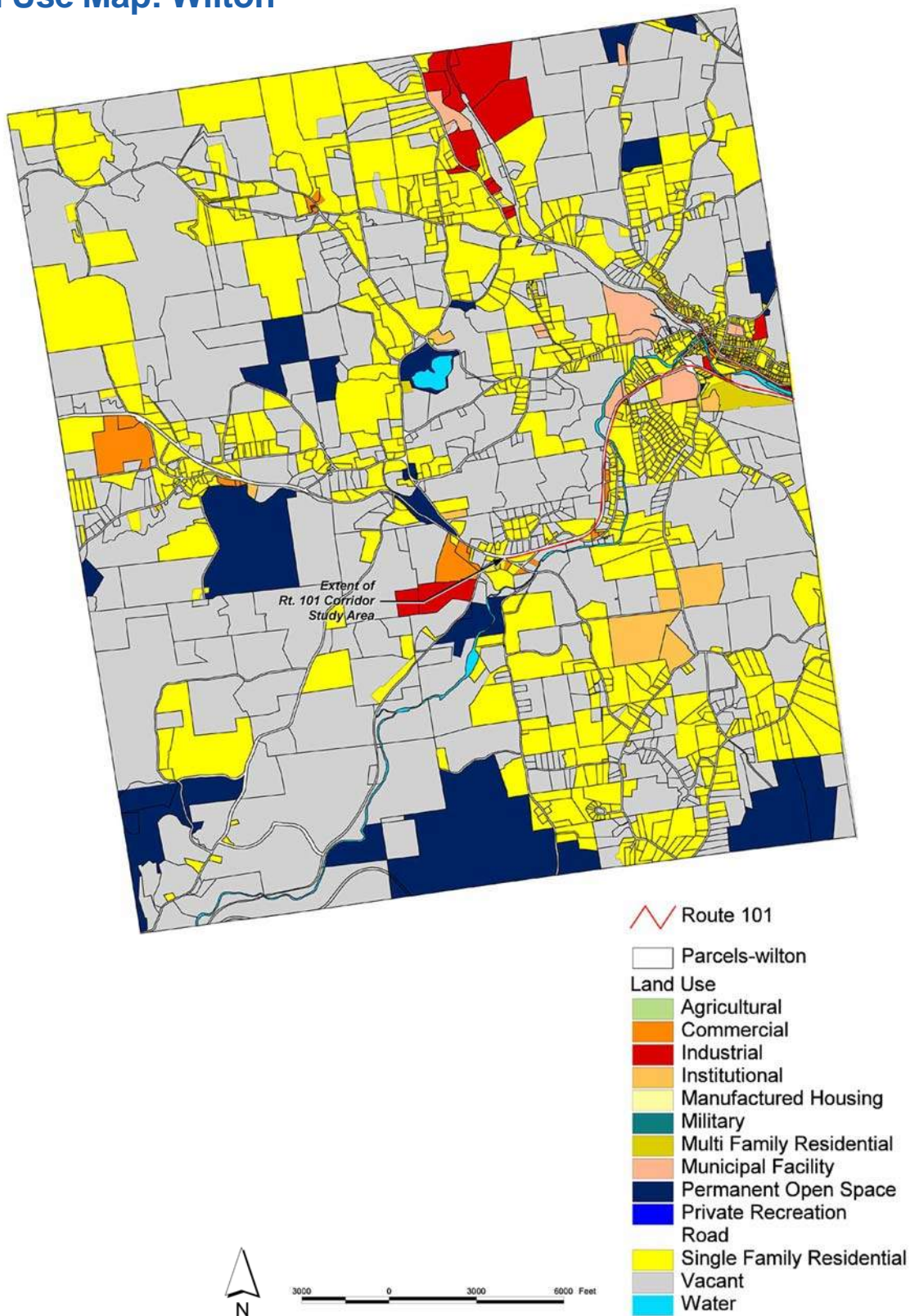
These provisions have obvious benefit for access management with benefits for traffic flow and safety along Route 101.

There are no guidelines or standards in Wilton's zoning that go beyond setbacks and maximum coverage to address visual aspects of commercial or industrial development.

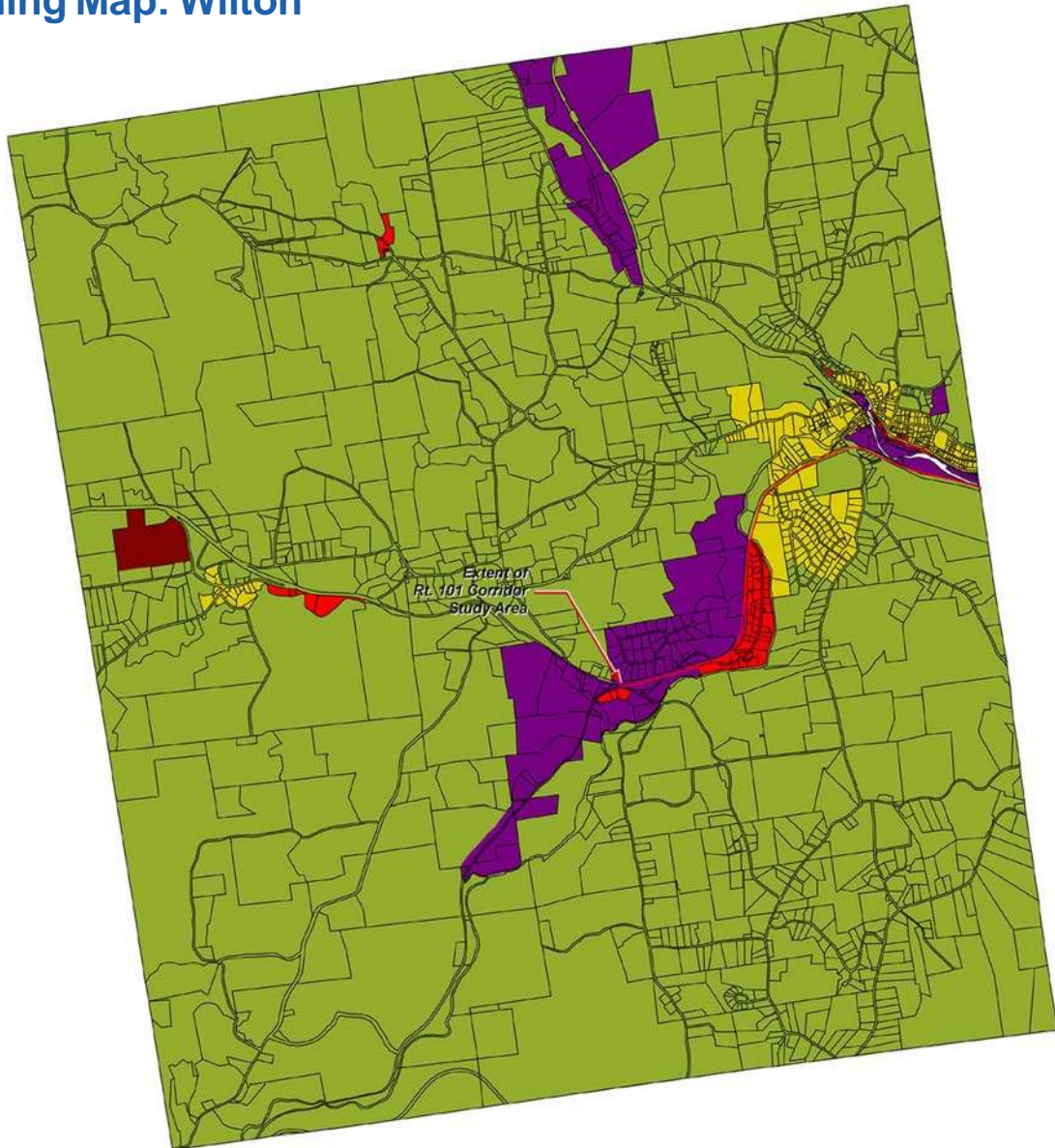
Issues and Opportunities

As more development occurs along Route 101 in the Commercial and Industrial districts, particularly west of the Souhegan River crossing, the character of the Route 101 Corridor will change. The special access provisions for Route 101 are innovative and provide a good basis for addressing access management issues. Wilton's zoning is clear and straightforward, so modifications are not really required. However, the existing provisions should be applied rigorously to key issues such as access management and landscaping along the highway. Some restrictions or conditions on highway-oriented uses with heavy access demands might also be considered.

Land Use Map: Wilton



Zoning Map: Wilton



- Route 101
- Parcels-wilton
- Zoning Legend
- OFFICE PARK
 - COMMERCIAL
 - INDUSTRIAL
 - RESIDENTIAL-AGRICULTURAL
 - RESIDENTIAL

3000 0 3000 6000 Feet



3.4.4 Build-out analysis

A build-out analysis was performed for the corridor study area. This analysis considers the maximum amount of development which could occur in the future if all buildable land were developed as allowed by current zoning. As discussed below, the analysis was based on realistic development densities: these are often well below the maximum possible building “envelope” that would be derived from zoning requirements for lot size, setback, building height, site coverage, and minimum parking requirements. In practice, development in areas like the Route 101 Corridor occurs at lower density with more open space and more parking than required and less building area than theoretically obtainable by following all dimensional requirements. There will be exceptions to this generalization, particularly on small parcels, but on average, development density is best approximated for this area by using 10% of the site area as a rule of thumb for commercial floor area, and 20% for industrial use. These averages were checked against actual recent development such as the Meadowbrook Industrial Park in Milford. Finally, vacant land was excluded from the analysis if it was constrained by very steep slopes and wetlands.

Amherst has essentially reached build-out in the Route 101 Corridor, owing to the small areas zoned for non-residential use and the town’s low-density residential zoning.

In Milford, most of the buildable vacant land with access to the corridor is already developed. The principal exception is the BROX property where, potentially, 400,000 square feet of industrial, distribution, and/or research and development use could be constructed, based on the town’s subdivision plan.

Wilton has a large area of land west of Abbott Hill zoned for industrial and commercial uses. There are 20 industrially zoned parcels ranging in size from 0.2 acres to 12 acres. (Parcels too small to meet frontage and other dimensional requirements were assumed to be developable if joined with adjacent parcels.) The total developable area of vacant industrial land in the corridor is approximately 57 acres (2.46 million square feet of land). This area could be built out with a total of 494,000 square feet of industrial buildings. (Commercial use is permitted in Wilton’s industrial districts but would in practice be developed at a lower density.)

Wilton has 16 vacant buildable commercially-zoned parcels in the corridor study area west of Route 101’s Souhegan River crossing, which range in size from one-half acre to 3.5 acres. The total commercially zoned developable area is approximately 24 acres. If fully developed for commercial use, these parcels could support approximately 106,000 square feet of new development.

In addition, Wilton has approximately 27 acres of residentially zoned vacant land in the corridor study area. Assuming that soil conditions are adequate for on-site disposal, approximately 25 dwelling units could be constructed.

Implications for the Route 101 Corridor

If build-out were reached, the potential development described above would have some effect on traffic volumes, particularly in Wilton, but this amount of new development (which would not be likely to be fully realized within 20 years) is consistent with the overall traffic projections used in the corridor study. Of more concern are the access management issues posed by new development with more parcels seeking access to Route 101, and more traffic at critical intersections like Old Wilton Road/Route 101. As described in the previous section, Wilton's zoning already contains provisions specifically aimed at managing access to Route 101 by encouraging shared access and connections between adjacent parcels.

3.5 Conservation Land

The accompanying map shows conservation and watershed protection land and Public open space in Wilton, Milford, and Amherst, based on data from the NRPC GIS department and checked locally. These lands are primarily municipal in ownership and serve a variety of purposes from recreation to aquifer protection. The key aspect of their location is that none of the conservation parcels other than Bragdon Farm in Amherst is traversed by Route 101, although a number of parcels are located near the highway right-of-way.

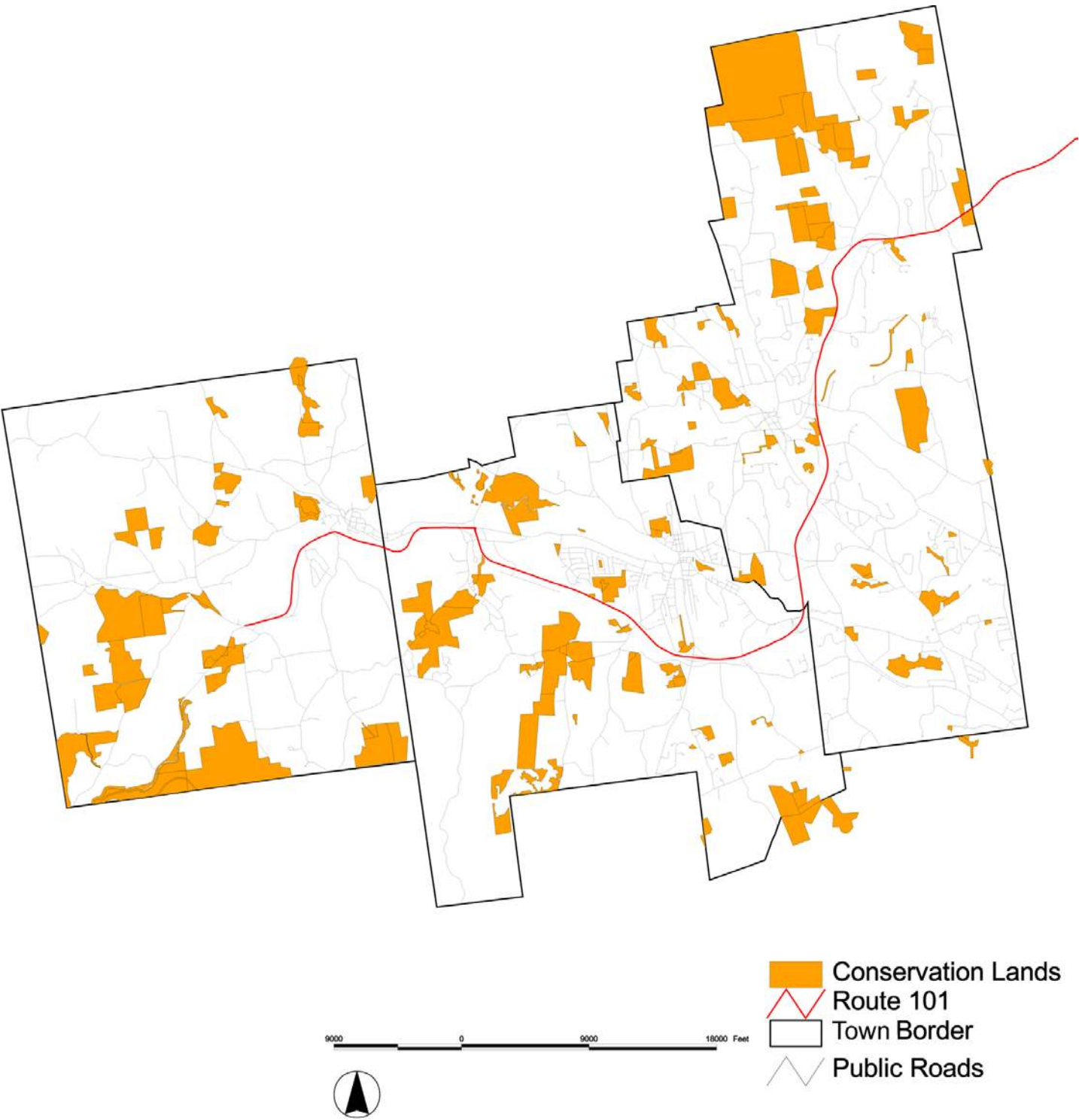
Issues and Opportunities

The map of conservation lands provides general information on the location of parcels which should be protected from impacts due to the highway and options for corridor improvements. Detailed information will be used in the evaluation of any improvement options which may affect these parcels.

3.6 Utilities

The Route 101 highway right-of-way is generally free from constraints due to public utilities. For example, although there are pole-supported electric power distribution lines along the highway in several locations, no major power line corridors cross the highway, and there are no regional sewer, water, or gas transmission facilities known to be in the right-of-way. When more specific highway improvement concepts are identified, part of their evaluation will be a more detailed examination of utility lines which may require relocation within the right-of-way or elsewhere. The New Hampshire Department of Transportation and individual utility companies can provide this information in response to specific proposals during preliminary design, but it is currently too early in the development of proposed improvements to seek this type of information.

Conservation Lands



3.7 Corridor Visual Analysis

3.7.1 Amherst

The section of Route 101 that crosses Amherst, Milford and Wilton can be described as a sequence of visual experiences. Different qualities of enclosure, topography, development, proportion, scale, and activity lead to variations in the visual character of Route 101, all of those elements adding up to the experience of driving along Route 101. The techniques for analyzing a sequence of “views from the road” was first developed in the 1950s by Donald Appleyard and Kevin Lynch; these techniques have been applied here to the Route 101 Corridor.

While people experience the Corridor directly, without being consciously aware of the elements that combine to create the experience, an analysis and description of these aspects can provide information for making decisions about what to change and what to preserve about the character of Route 101 as it passes through each town. What follows is a synopsis of a visual analysis conducted for the section of the Route 101 Corridor passing through the towns of Amherst, Milford, and Wilton. The accompanying maps and photographs document the sequence of views from the road.

In Amherst, the visual character of Route 101 can be divided into four distinct stretches of road: the first is an east-west stretch leading from the Bedford town line to Horace Greeley Road; the second is a north-south stretch to Blueberry Hill Road; the third is a north-south stretch leading to Corduroy Road; and the fourth is a stretch leading to the Milford Border.

In the first (east-west) stretch, the topography generally has slopes cross-wise to Route 101 and slopes down to the south and up to the north, affording numerous expansive views of the largely open, rolling countryside ahead and to the south. Views are punctuated by intermittent lines of tall trees along the road edge and occasional development in the form of isolated structures set back from the road. The road is contained to the north by upward sloping land and more consistent lines of trees.

The second (north-south) stretch is generally more constrained than the first stretch. The open sight lines from the road to lower elevations are gone, and both east and west side of the road have similar elevations. A solid line of tall trees fronts both edges of the road. There is no development along this stretch to break the continuity of the tree wall; however halfway along this stretch the trees thin out and provide a screened view of the pond between the eastern edge of Route 101 and Old Manchester Road.

A greater sense of openness describes the third (north-south) stretch of Route 101 in Amherst. Trees are lower and set far back from the road edge; however, broad views over the countryside are few. The road changes elevation slowly, and a sense

of riding a ridge occurs as one approaches the traffic interchange where Route 101 overpasses Route 122 (Ponemah Road). Brief glimpses of the rolling countryside below occur at the overpass.

The final (north-south) stretch of Route 101 in Amherst is characterized by numerous broad views of the rolling countryside. Three factors contribute to this quality. First, there is an absence of development along the road edge, thereby avoiding visual obstructions. Second, the trees along the road are set far back and open up frequently. Third, the road rides along an elevation that is higher than its immediate surroundings (with overpasses at Ponemah Road and Merrimack Street and the Souhegan River), giving a vantage point to the countryside.

Visual Analysis: Amherst





15



20



25



16



21



26



17



22



27



18



23



28



19



24

3.7.2 Milford

In Milford, the visual character of Route 101 can be divided into three distinct stretches of road: the first is an east-west stretch leading from the Amherst border to an area west of Ball Hill Road; the second is an east-west stretch to the curve on the Route 101 Bypass just before Old Wilton Road; and the third is a developed stretch through the area around the intersection of Route 101 and 101A (Elm Street) to the Wilton town line.

The first stretch of Route 101 in Milford is characterized by numerous broad views of the rolling countryside ahead and to the south. To the north, heavy vegetation and slightly higher topography limit views, but do not impede a sense of openness. To the south, the absence of development along the road edge, trees that are low, set far back from the road, and open up frequently, and a relatively level surrounding landscape provide a dramatic sense of the entire countryside along this stretch of road and a glimpse of the distant Mount Monadnock.

The dramatic views of the previous stretch of road are replaced in the next stretch by lines of low trees set back from the road edge. This area is continuous in character along its entire length, with the only change occurring at the end of the bypass where the road turns to the north and connects to a more developed area.

The last stretch of Route 101 in Milford is characterized by a combination of industrial development at one end, and roadside commercial development at the other. The topography is generally flat along the road, but slopes up dramatically in the background. At the intersection of Elm Street and Route 101, traffic dominates the environment and buildings are set far back to accommodate large parking lots, and there is little foliage along the street edges. After Route 101 turns west beyond the 101/101A intersection, there is a dense strip of automobile-oriented commercial development located close to the road with little setback or separation of sites. Buildings and trees are situated close to the street edge. As one approaches Wilton, the topography slopes up dramatically to the south to Dram Cup Hill, and to the north one sees a series of views of the Souhegan River screened by trees along its edges with the land sloping up behind it.

Visual Analysis: Milford





29



34



39



30



35



40



31



36



41



32



37



42



33



38

3.7.3 Wilton

In Wilton, the visual character of Route 101 can be divided into two distinct stretches of road: the first is an east-west stretch leading from the Milford border to Intervale Road, and the second is a stretch heading roughly northwest to Route 31, where the Corridor Study Area ends.

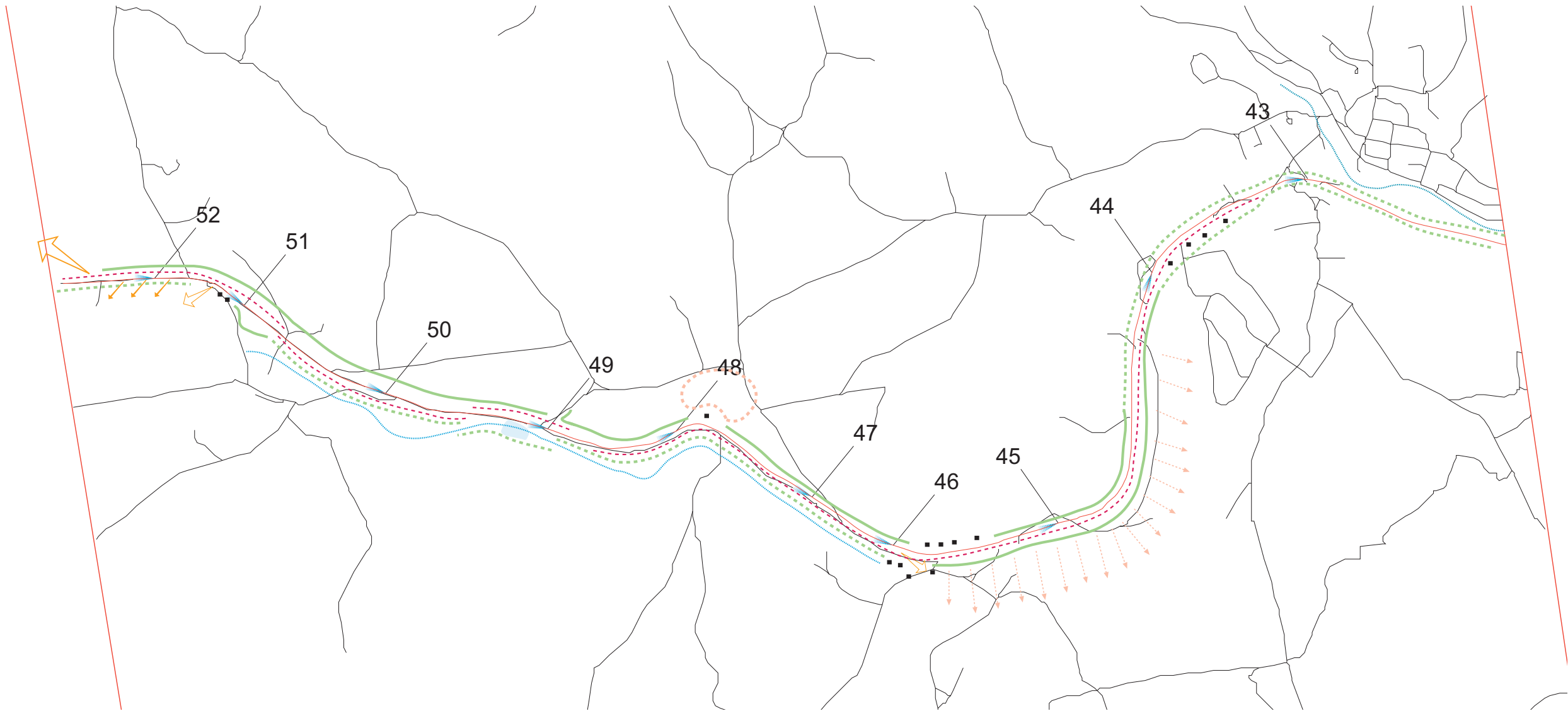
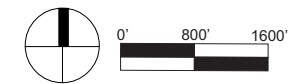
The most dominant aspect of this area of Route 101 is the topography. The road runs between the foot very steep and heavily vegetated slopes to the south and the Souhegan River to the north. Development occurs intermittently and at a lower elevation than Route 101, affording broad but brief views of historic mill buildings and downtown Wilton. Traveling east on this stretch, there is a brief but dramatic view of the church steeple in the downtown.

The second stretch, which begins as Route 101 crosses to the north side of the river, is less developed, with heavy vegetation along both sides of the road and brief views out to the north. At the end of this stretch, the topography levels out, trees are intermittent and set back, and there are patches of commercial use along the south side of the road including garden centers, a truck-oriented business, convenience store, and the Monadnock Spring Water Company. These commercial uses vary in type but are seen as independent islands of activity in the larger landscape around them. One sees several houses as the Corridor Study Area approaches its end where Route 31 diverges south.

Visual Analysis: Wilton

Legend

- Photograph
- Broad View
- View
- Driveways
- Freestanding Trees
- Overhanging Foliage
- Wall -Like Foliage
- Screen-Like Foliage
- Telephone Lines
- Structures
- Rock Outcropping
- Upward Slope
- Hill
- Lakes/Ponds
- Rivers/Streams
- Town Line
- Parcels
- Roads





43



48



44



49



45



50



46



51



47



52

3.8 Natural Systems

3.8.1 Wetlands and Waterways

Wetlands are important natural resource areas that support wildlife and contribute to water quality improvement and control of flooding. They are also viewed by many people as making important contributions to community aesthetics and quality of life. Wetlands are regulated at both the state and federal level, and they may be a key issue during environmental review of highway improvements. Therefore, it is important to be aware of their location and give them due consideration in planning for improvements. Wetland impacts are one of the key issues in evaluating options for improving Route 101.

Wetlands are shown on the map below.

Amherst

Amherst has many significant wetlands along the Route 101 Corridor. (A principal reason for providing ramps at Route 122/Ponemah Road only to and from the south was to minimize impacts on the large adjacent wetland.) Route 101 runs along a large wetland system beginning just west of Schoolhouse Road, crossing it east of Horace Greeley Road, and running along the wetland's north edge for another 2000 feet; Salzburg Square lies between the highway and the middle portion of this wetland.

A second large wetland system drained by Beaver Brook lies east of Route 101 between Walnut Hill Road and Baboosic Lake Road. This wetland is in turn connected to a series of wetlands on the west side of the highway from the Thatcher Drive/Thornton Ferry Road area to Boston Post Road, where it crosses to the east side of Route 101. The southern end of this wetland complex is adjacent to the half-interchange at Ponemah Road, as described above. Beaver Brook then runs on a course that is farther from Route 101, joining the Souhegan River approximately 2000 feet east of the Route 101 bridge. The Route 101 river crossing is environmentally sensitive and may constrain any potential improvements that would widen the highway at that location.

Milford

Beyond the Souhegan River, Route 101 is on high ground, crossing an intermittent brook approximately one-half mile east of Route 13. A wetland system along the brook running west of Route 13/Mont Vernon Road borders the Route 101/Route 13 interchange and is crossed by the highway at this point. The highway runs near the large wetland system associated with Great Brook, Birch Brook, and Osgood Pond. It passes through the BROX property, which contains a significant wetland. Perry Road, which provides access to the BROX land from Old Wilton Road is also bordered by wetlands where it crosses Tucker Brook. These wetlands are con-

straints which are addressed by the Milford's subdivision plan for the BROX property and also constrain improvements to the Perry Road access.

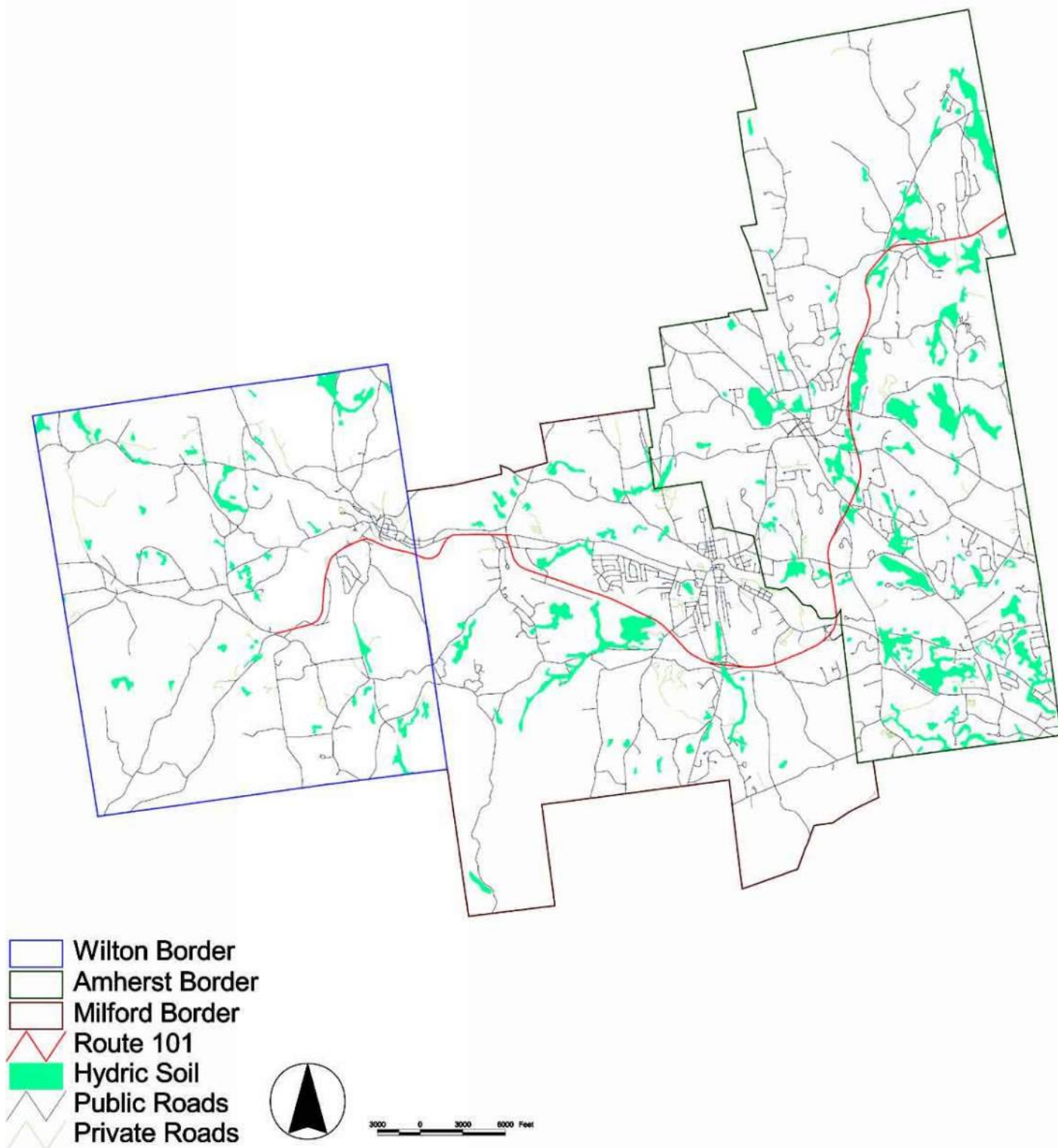
Beyond the 101/101A intersection in west Milford, the highway runs parallel to the Souhegan River; widening in this area may have impacts on the river bank and is thus a constraint that must be addressed.

Wilton

Significant wetlands are generally absent from the Route 101 corridor study area in Wilton, with the exception of the bridge over the Souhegan near the east end of Intervale Road.

Implications for the Route 101 Corridor

Wetland encroachment should be avoided altogether whenever possible. Where options for roadway improvement may have impacts on wetlands, the severity of impact will be an important criterion in evaluating the option. Where avoidance is not possible and there is sufficient justification for the improvement, impacts should be minimized through design to the extent possible, and the necessary permitting process should be included in the implementation strategy.



3.8.2 Floodplains and Stormwater

Flooding is a natural phenomenon which can be worsened by development and filling. As shown on the accompanying map, there are flood prone areas along the Souhegan River and its tributary brooks and wetlands.

Flood-prone areas are regulated locally through zoning, in response to federal mandates in connection with the Federal Emergency Management Agency (FEMA) flood insurance program. FEMA has prepared maps delineating floodplains based on hydrologic studies and investigation of historic flooding events. Flooding is also an important consideration in wetlands regulation. The hydrological relationships of stormwater runoff and flooding with wetland resources is a complex one which must be addressed during design and permitting. However, the so-called “100-year floodplain” is a good rule of thumb for anticipating issues in a planning study. (The term “100-year” is used to denote flood levels associated with a 1 percent probability in a given year; it is possible to have 100-year floods two years in a row.) The 500-year (0.2 percent probability) storm is also delineated on FEMA maps.

There are three general considerations applicable to flood-prone areas:

- Don’t impede the passage of flood water
- Minimize filling of land below the 100-year flood level, thereby displacing flood storage and widening the area of flooding
- Minimize increases in impervious surfaces, which contributes to the amount and speed with which stormwater runoff reaches waterways and wetlands.

In addition, roadways should be above the 100-year flood elevation so that they continue to function when intense storms cause flooding. This consideration needs to be addressed in providing access improvements serving the BROX property, because Perry Road runs through a flood-prone area.

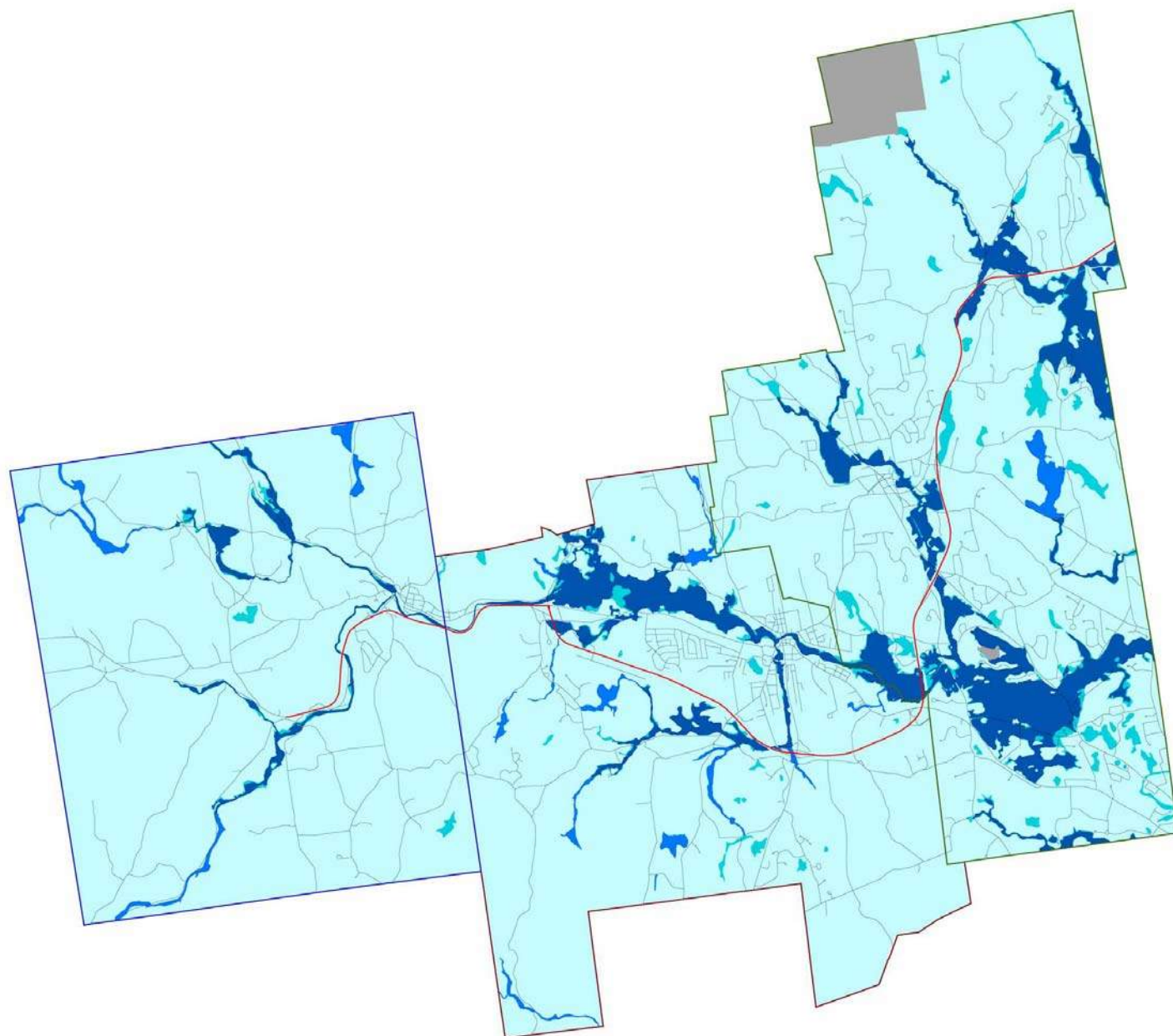
Stormwater discharge is an important aspect of the design of the highway and development of sites along it. Rain and snowmelt on pervious surfaces such as grassy and wooded land percolate into the ground replenishing groundwater, and excess runoff during intense storms travels more slowly on vegetated land, reaching streams and rivers over an extended period of time which the waterways can accommodate more successfully than the sharply peaked discharge from impervious surfaces like parking lots, building roofs, and roadways.

Stormwater drainage is an important aspect of highway design. Route 101 discharges through swales and culverts to natural drainages at hundreds of points along its length. No specific stormwater discharge problems have been identified to date, but any improvements that increase the highway’s paved cross-section or introduce access ramps must be carefully designed to accommodate stormwater appropriately. Stormwater analysis is part of the design and permitting process,

and both engineering practices and standards and regulatory criteria require that stormwater impacts be minimized.

Implications for the Route 101 Corridor

These considerations must be borne in mind when considering projects that widen the highway in flood-prone areas. They are also considerations in development of land along the corridor, with impervious site cover being an issue for site plan review and guidance.



- Route 101
- Wilton Border
- Amherst Border
- Milford Border
- Public Roads
- Flood Plains Rt. 101
- 100 yr floodplain - approximate
- 100 yr floodplain - detailed
- Area Not Included
- Area Outside the 100 yr Floodplain
- 500 yr floodpalin



0 10000 Feet

3.9 Historic and Cultural Resources

Historic resources are an important part of the heritage of the Route 101 Corridor towns and an important part of the sense of place and quality of life in each town. The map on the following page shows the location of historic resources in Wilton, Milford, and Amherst which have been listed in the National Register of Historic Places. These include both residential and industrial buildings, public buildings, and the Amherst Village National Register historic district, which comprises several houses, the church, the common, and the Town Hall as contributing elements. Data was provided by the NRPC GIS department and checked with the National Register.

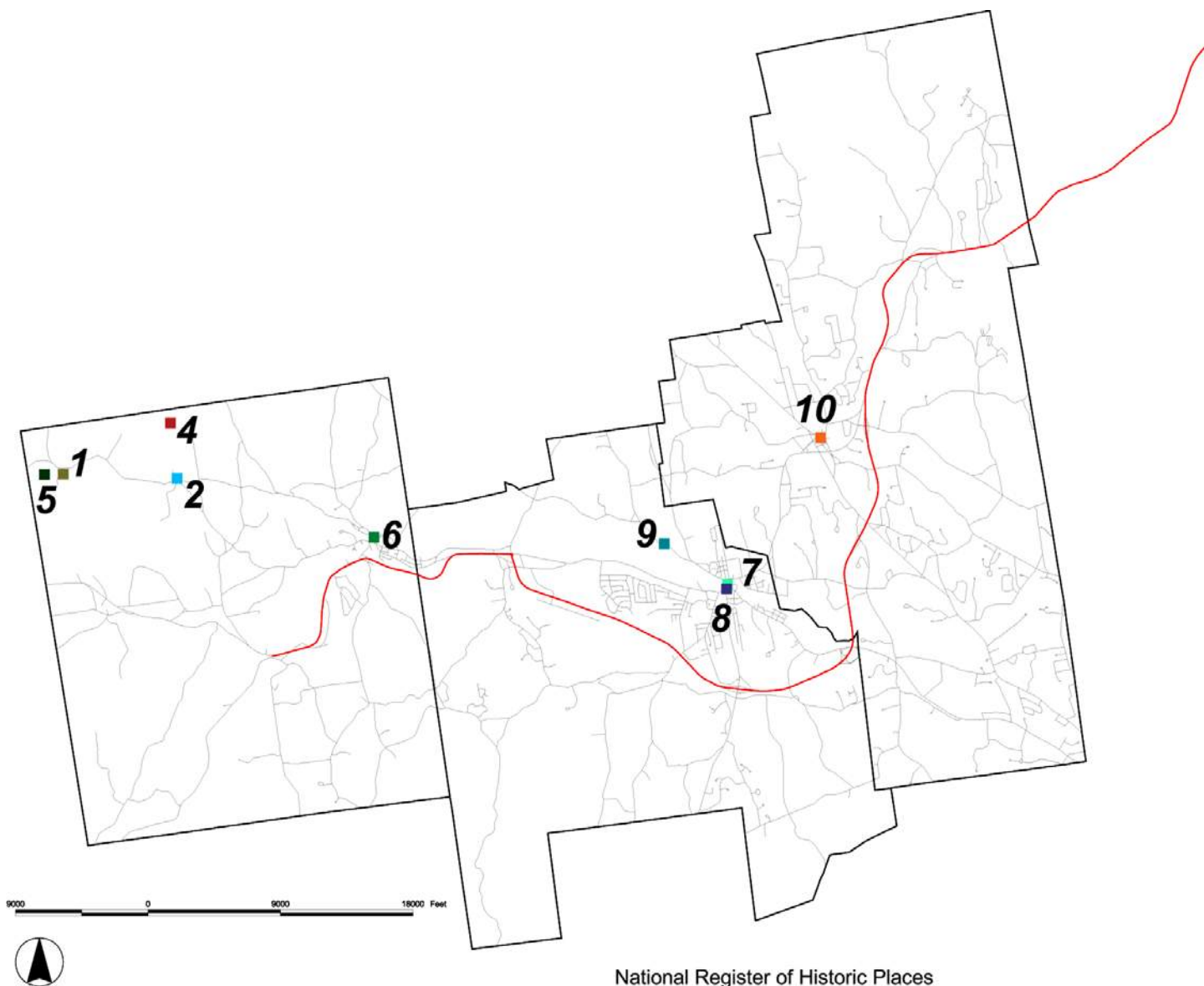
In addition to the intrinsic value of historic and cultural resources, National Register status is also important in that Section 4(f) of the federal Transportation Act and Section 106 of the National Historic Preservation Act regulate transportation improvements that are funded in part by the federal government. These regulations limit the impacts of projects on the resources, and in the case of Section 4(f) may dictate that certain alternatives which completely avoid the resource must be selected if it is prudent and feasible to do so. Both laws also require minimization of any impacts that cannot be avoided altogether. These laws apply not only to listed properties but also properties which the New Hampshire State Historic Preservation Officer determines are *potentially* eligible for listing.

There are other resources in the three towns which are historic but not listed on the National Register, although some may be potentially eligible for listing. Just as the listed properties are located some distance from Route 101, these non-listed historic resources do not appear to be located near the highway. This reflects that fact that Amherst Village and downtown Milford and Wilton are not traversed by Route 101.

The term “cultural resources” refers to archaeological sites of prehistoric origin. In order to protect the integrity of these sites, their location is not publicly available information. However, as part of the evaluation of any roadway improvements that substantially extend the footprint of the highway (for example, a new interchange), location sketches will be sent to the New Hampshire State Historic Preservation Officer for review with respect to known archaeological sites. If this review suggests that the presence of undocumented archaeological sites is possible in the affected area, a survey may be required during engineering design of the improvement.






Implications for the Route 101 Corridor

Historic and cultural resources do not appear likely to affect plans for the Route 101 Corridor.



National Register of Historic Places

- 1 County Farm Bridge
- 2 Craigin, Daniel, Mill
- 4 Stonyfield Farm
- 5 Whiting, Oliver, Homestead
- 6 Wilton Public and Gregg Free Library
- 7 Milford Cotton and Woolen Manufacturing Company
- 8 Milford Townhouse and Library Annex
- 9 Peabody, William, House
- 10 Amherst Village Historic District

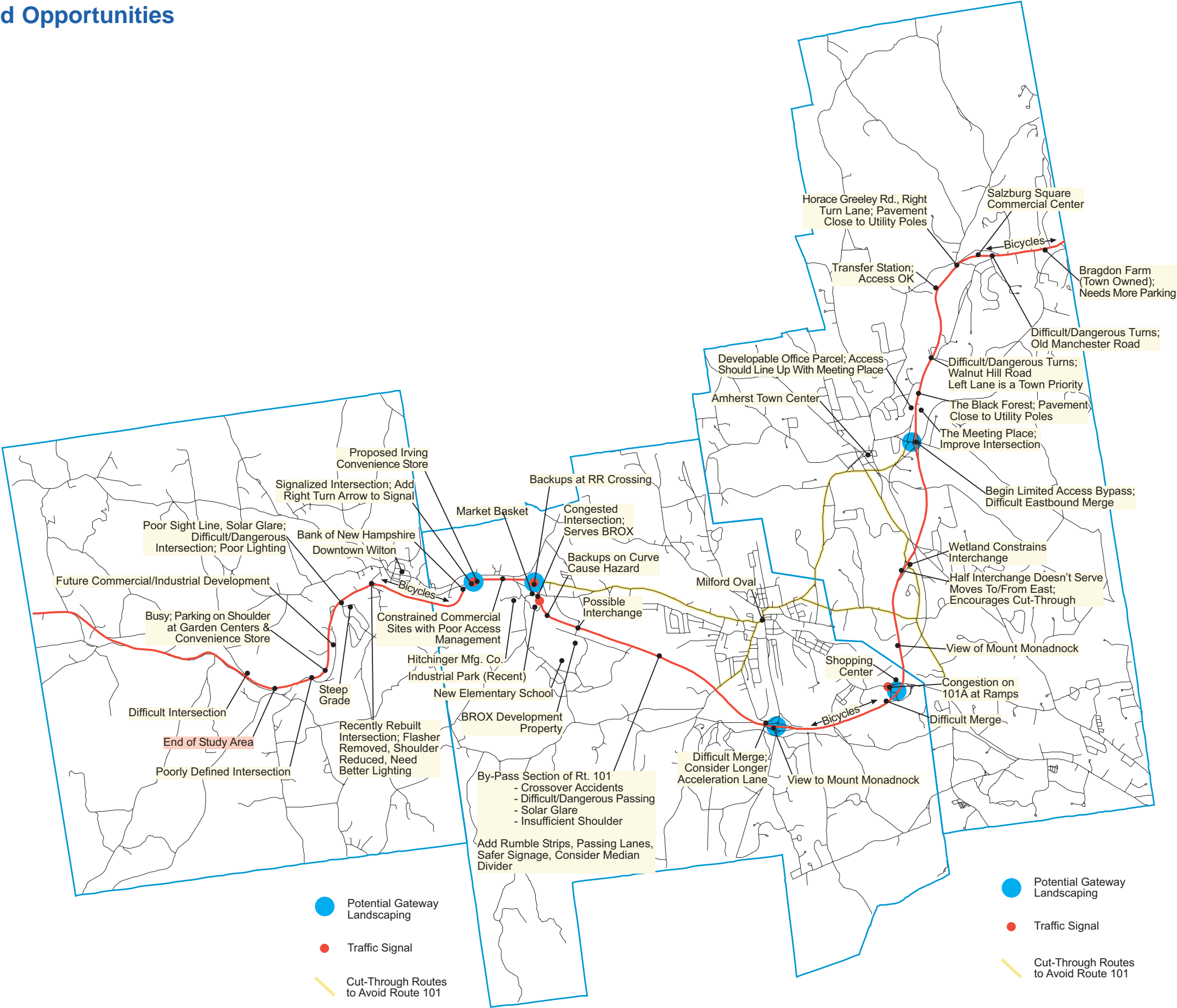
-  Route 101
-  Wilton Border
-  Amherst Border
-  Milford Border
-  Public Roads

3.10 Summary of Issues and Opportunities

The Corridor Study conducted two public meetings in each of the three town in the corridor, one set in May-June 2001 and Visioning Workshops in January 2002. From these meetings, which were well attended by residents, business people, and town officials, as well as analysis of the data collected in the first phase of the study, a series of issues and opportunities has been developed. These issues and opportunities are summarized on the following map. Meeting summaries are included in the appendix to this report.

In addition to location-specific issues and opportunities, there are implications of floodplains and wetlands, land use patterns and zoning that are more widely applicable; they are discussed in the preceding report sections.

Summary of Issues and Opportunities



4.0 Vision for the Future

Based on workshops held in Amherst, Milford, and Wilton during January 2002, the following Vision Statement is proposed. Although the Vision is not a guarantee of a successful outcome, it is optimistically worded to provide a description of the best realistic outcome and to serve as a benchmark to evaluate the success of the Corridor Plan.

“Over the next 20 years, traffic is expected to increase on Route 101. At the same time, improvements in each town will improve safety and traffic flow and reduce the highway’s impacts on each town.

Safety is the highest priority. Provisions will be made for traffic to enter the highway from side streets and commercial driveways, and for vehicles on the road to make safer turns into these streets and driveways. Better access management will reduce points of conflict. Hazards due to limited sight distances will be addressed. Existing signalized intersections will be improved to reduce safety problems.

On the bypass section in Amherst and Milford, improvements will reduce accidents caused by vehicles crossing the center line. Improvements will provide for passing slower traffic at appropriate locations in a safe manner and for traffic to safely enter and leave the highway from intersecting roads. Hazards due to limited sight distance will be addressed.

Traffic flow is also a priority. Despite higher volumes in the future, traffic flow will be improved wherever possible through physical improvements and access management, or where this is not feasible, the degradation in traffic flow will be reduced to the extent possible. Improved flow on Route 101 and at interchanges will help to reduce cut-through traffic on local roads which impacts residential areas. The western 101/101A intersection in Milford and traffic flow into Wilton will be areas for improvement.

Other modes of transportation also play an important role in achieving a balanced transportation system. There will be provisions for bicycles traveling along the corridor or crossing it. Inter-city bus service along the corridor would improve mobility for corridor residents. Existing rail freight service must be preserved and coordinated with traffic flow at the crossing in Milford.

The above priorities notwithstanding, the current character of Route 101, as a rural highway with scenic qualities typical of this part of New Hampshire, will be preserved wherever possible. Pavement widening may be necessary, but impacts will be minimized, particularly where wetlands, mature trees, and businesses would be affected. Aesthetics will also be improved by requiring landscaping and good design for all improvements. Gateway landscaping will help define the key en-

trances to each town from the corridor.

Little or no future development requiring access from Route 101 is foreseen for some areas, for example, Amherst east of the bypass section. Additional commercial development is possible in Wilton, and there is a need for development coordination in the area around the western 101/101A intersection, including the BROX property now owned by the town. Guidelines for site design, landscaping, signage, lighting, and architecture will result in better quality new development and long term improvement of areas already developed.

The Route 101 Corridor Plan will be coordinated in the three NRPC region towns and in Bedford. The plan will also be coordinated with traffic studies and improvements adjacent to the corridor, e.g., the Route 101A Corridor Study and the TCSP townwide transportation studies. The Plan and its Implementation Strategy will be developed to identify feasible funding sources and priorities for action over the short, medium, and long term.”

5.0 Strategy and Evaluation of Concepts for Improvement of the Corridor

5.1 Strategy

Based on the analysis of data presented in the first part of this report, together with input from citizens at public meetings, a strategy was developed to realize the Vision for the Route 101 Corridor. The strategy has several parts.

Short- to mid-term need for bypass safety improvements

The most urgent need is to address the series of fatal head-on collisions on the bypass. Since these accidents appear to be due to driver inattention, an immediate action is to provide safety warnings on fixed and variable message signs. Beyond this first step, it is necessary to provide greater separation between the opposing travel lanes, which can be accomplished by shifting the travel lanes enough to provide a 4-foot painted median.

Mid- to long-term need for 4-lane median divided cross-section Milford and Amherst

Based on the traffic analysis and projections, four travel lanes (two lanes in each direction) are necessary on Route 101 to provide acceptable levels of service from the Bedford/Amherst town line to western Milford. This stretch of roadway should be median-divided to control left turns and provide a permanent solution to crossover accidents. In Wilton, levels of service will be at the borderline of acceptable service with two travel lanes so the strategy there is to provide full shoulders with a two-lane undivided section.

Interchange improvements

All interchanges on the bypass must be reconstructed to accommodate the wider cross-section. At the same time, ramp improvements can provide better acceleration distances for safety, and congestion at the ramp entrances and exits can be relieved by reconfiguring the ramps.

Alleviation of congestion in western Milford

The traffic signals at Old Wilton Road, Route 101A, and Wilton Road will become increasingly congested if nothing is done, and the stretch of highway with many commercial driveways between the Souhegan River and the railroad tracks will be a major bottleneck with failure levels of service (LOS F). To solve this problem, a short extension of the bypass will allow the through traffic to avoid the area, which will improve levels of service at these intersections and permit access improvements in the bottleneck.

Improvements in Wilton

Providing full 10-foot shoulders and improving geometrics and sight lines at sub-standard intersections will improve both traffic operations and safety. A traffic signal should also be provided at Greenville Road in the longer term.

Access management outside the bypass section

Both east and west of the bypass section it is important to control left turns, which reduce the capacity of the highway to carry traffic and contribute to accidents. The divided median limits left turns to selected locations, and overpasses with turn-arounds allow traffic to access side streets and driveways with safer right turns.

Landscaping at Gateways

As drivers leave the highway at interchanges, gateway landscaping provides an appropriate entry into each town and signals the change from high-speed highway to lower speed local street system.

Pedestrian and bicycle improvements

The regional bicycle route system crosses under the Route 101 bypass in several places and will be unaffected by the improvements. Local overpasses will provide safe-crossing points in Amherst north and east of the bypass, and improved shoulders will improve safety for on-road cyclists in Wilton. Pedestrian crossings should be included in intersection improvements in western Milford. Where interchange ramps meet local streets, the design should accommodate pedestrians who may be present on the local street. In addition, the BROX design guidelines provide for a pedestrian and bicycle path system.

Guidance for Non-residential development

Existing regulations are already in place in each town to address commercial and industrial development. New guidelines should be adopted for the BROX industrial development and the area along Perry Road in Milford. Existing regulations should be used to manage access and provide good landscaping along the highway.

5.2 Evaluation Criteria

In developing and evaluating options for improvements to the Route 101 Corridor, a series of evaluation criteria were used to test the feasibility of each improvement and to weigh alternative concepts where different approaches were considered. They are as follows:

-
- Consistency with vision. The proposed options are consistent with the Vision for the corridor. Although the projected traffic volumes require a 4-lane divided cross-section for much of the corridor, the plan limits pavement expansion to the extent possible and proposes only one new traffic signal (at Greenville Road in Wilton). Safety and traffic operations will be improved, traffic cutting through residential areas will be encouraged to stay on the highway, and the character of the corridor will be preserved.
 - Transportation benefit. The proposed options solve many of the current and future operational and safety-related problems and make Route 101 a much better east-west transportation corridor in southern New Hampshire.
 - Consistency with streetscape and aesthetic design guidelines. Highway and gateway landscaping will maintain the aesthetic quality of the corridor. Applying existing development regulations will control visual clutter and improve the appearance of commercial and industrial areas.
 - Impact on town cohesiveness. Route 101 has less impact on cohesiveness in Amherst, Milford, and Wilton than in Bedford because it bypasses the centers of the three towns. Local overpasses in Amherst, and gateway landscaping help to improve town cohesiveness, and the reduction of traffic in western Milford will make that portion of town more cohesive.
 - Effect on town economic and fiscal well being. The beneficial effects of congestion reduction and access management are greater than limited economic impacts due to restricting left turns. In western Milford, the reduction of through traffic in the commercial district will improve access to businesses.
 - Promotion of access management. The options combine to provide excellent access management throughout the median divided section from the Bedford town line to western Milford. In Wilton, existing zoning provides good control of curb cuts and encourages shared driveways to reduce the number of access points on the highway.
 - Potential to increase non-motorized travel. Although the designated bicycle routes currently cross under the bypass, bicycle transportation will be improved by the provision of better shoulders in Wilton and local overpasses in Amherst. Western Milford can become more bicycle- and pedestrian-friendly when the majority of through traffic bypasses the area on the proposed bypass extension.
 - Environmental and cultural impacts. The proposed options are not completely free of environmental impacts, but every effort was made to minimize encroachment in wetlands, and the better flow of traffic will contribute to air quality conformity. The selected option for extension of the bypass avoids impacts on the Souhegan River and other floodplains and floodways. There is no impact on conservation land. There are no impacts on historic or cultural resources.
 - Right-of-Way and abutter impacts. The existing right-of-way is adequate for nearly all of the proposed improvements. Where additional property is required, as in the local overpasses and service roads in Amherst, the area required is relatively small, and the preferred options minimize abutter

impacts where possible. The bypass extension in western Milford will require a new right-of way and the partial or full taking of a modern building in Meadowbrook Industrial Park, but the overall benefit to abutters in the area justifies this impact, and the industrial park as a whole will remain functional and viable.

- Impact on utilities. No impacts are anticipated on major utilities.
- Joint public/private funding opportunities/resources. Most of the plan's recommendations are appropriate for public sector action without private participation. However, there is a major opportunity for public private partnership in the development of the BROX land in Milford, and there is potential for similar cooperation in the long-term development of the industrial land in Wilton.
- Capital, operating and maintenance costs. Route 101 is a major state highway serving southern New Hampshire, and the costs of improvement (approximately \$54 million, most of it for widening and extending the bypass section) are well justified in terms of safety and transportation benefit. Operation and maintenance costs will be typical of this class of highway and should be borne by NHDOT.
- Ease of implementation. The improvements are relatively straightforward and do not present unusual construction issues. The major implementation issue is securing funding for the improvements; however, implementation is phased over 10 to 15 years and the importance of the highway regionally and statewide makes these improvements relatively high in priority.
- Public support. Work was done from the inception of the planning study to involve citizens and consult with local officials. As a result, public support for the improvements is strong.

5.3 Traffic Operations Analysis of Improvements

As concluded in section 3.1 of this report, a four lane cross section will be needed for most of the route 101 corridor. However, the functional character of Route 101 as the state highway traverses the communities of Amherst, Milford, and Wilton differs from one segment of the corridor to another. As a consequence, the safety and operational issues along the corridor differ and therefore the improvement plan must reflect the specific needs of the various segments. From a functional perspective the corridor can be divided into the following four distinct segments.

- East of the Bypass in Amherst (Baboosic Lake Road to the Bedford town line)
- The Bypass in Milford and Amherst (Old Wilton Road to Baboosic Lake Road)
- Western Milford (Wilton Road to Old Wilton Road)
- Wilton (Greenville Road/Route 31 South to Old Wilton Road)

East of Bypass in Amherst (Baboosic Lake Road to the Bedford town line)

The primary issue along the eastern segment of Route 101 in Amherst is one of access. There are a number of side streets and commercial driveways where left-turn movements entering the corridor as well as exiting the corridor are problematic. Left-turn movements entering the corridor from side streets such as Blueberry Hill Road, Walnut Hill Road, Horace Greeley Road, Old Manchester Road and others operate at LOS F with long delays. The same condition occurs at commercial driveways such as The Meeting Place, the town Transfer Station, and Salzburg Plaza.

To provide safe and efficient access to these side streets and driveways would necessitate either a series of traffic signals along the corridor or some type of connector roadways or overpass roadways. Based on input received at previous public meetings, a series of traffic signals would not be consistent with the future vision of the corridor expressed by Amherst representatives. Therefore, the improvement plan for this segment of the corridor focuses on the development of connector roadways.

One opportunity to provide a connector roadway would be to construct a local overpass that would connect Horace Greeley Road with Stockwell Road. With a raised center median along Route 101, this overpass would not only accommodate the left-turn movements to and from Horace Greeley Road and Stockwell Road, but would serve as a turnaround area where motorists exiting Salzburg Plaza and other side streets such as Schoolhouse Road, Saddle Hill Road, and Holly Hill Drive could reverse direction.

Access points that are closer to the Baboosic Lake Road interchange, such as The Meeting Place and Walnut Hill Road would best be served by constructing a parallel connector roadway back to the interchange. Unfortunately, most of the land running along the east side of Route 101 between Walnut Hill Road and the interchange is covered with wetlands.

One option would be to realign and widen Route 101 to the west (away from The Meeting Place). A local parallel connector roadway would be constructed between Walnut Hill Road and The Meeting Place within the footprint of the existing Route 101. The local roadway would pass beneath the realigned Route 101 and connect to Amherst Street providing The Meeting Place and Walnut Hill Road access to the Baboosic Lake Road interchange.

This alternative would require the reconstruction of the interchange, the construction of bridge structures where Route 101 would pass over the local connector roadway and where it would pass over Blueberry Hill Road. This alternative would require the taking of the bakery on the west side of the roadway.

A second alternative would be to widen Route 101, but maintain the roadway at its present location. A parallel connector roadway, similar to the first alternative, would extend from Limbo Lane, connecting to Blueberry Hill Road, and crossing over the highway to Walnut Hill Road on a local overpass. A connector to Route 101 would provide right-turn access. This system would provide Walnut Hill Road and Old Manchester Road safe and efficient westbound access while retaining right-turn ac-

cess in the eastbound direction. Blueberry Hill Road would have eastbound access at the Amherst Street interchange. The Meeting Place would have westbound access by way of the Amherst Street interchange; for egress from the Meeting Place to the west, an additional connection would be required where the local overpass connects to Walnut Hill Road; this may or may not be justifiable based on cost.

Based on input from the Steering Committee, the second alternative was selected as the preferred alternative.

The Bypass in Milford and Amherst (Old Wilton Road to Baboosic Lake Road)

The primary issue along the Bypass today is one of safety. To enhance the safe and efficient flow of traffic along the Bypass and to accommodate the future traffic volume demands this limited access segment of the corridor should be widened to a four-lane median divided cross-section. Each of the interchanges along the Bypass would need to be reconstructed to accommodate the widening of the highway. Traffic signal control would be provided at the ramp intersections with Route 13.

The upgrade at the Route 101A interchange would include the installation of a traffic signal at the Route 101A eastbound ramps as well as the widening of the off-ramp to provide a double right-turn lane. In addition, although the intersection improvements that are currently under construction at the westbound ramps are expected to provide an acceptable level of service under the 20-year design condition, the proposed plan calls for the construction of a flyover ramp that would allow motorists from the east on Route 101A to access directly onto the Bypass in the westbound direction without passing through an at grade traffic signal. The direct connection to the Bypass may discourage motorists from cutting through downtown Milford.

Western Milford (Wilton Road to Old Wilton Road)

Traffic operations along Route 101 in western Milford are controlled by the operations of the three signalized intersections with Wilton Road, Route 101A, and Old Wilton Road. In addition, this section of the corridor is located along a commercial strip with numerous driveways and is situated between an active railroad line and the Souhegan River, where there is not sufficient width to widen the roadway to the four lanes that are needed to accommodate the projected traffic volumes. Currently, motorists along this section of the corridor experience substantial congestion and long delays.

The proposed plan calls for extending Route 101 from just east of the Old Wilton Road intersection along the north side of Dram Cup Hill and rejoining the existing alignment east of the Wilton town line. This new alignment would essentially bypass the three existing traffic signals and would allow the east-west through traffic on Route 101 pass through the area without crossing the active rail line.

Slip ramps would be provided at the east end of the new roadway that would accommodate motorists destined to or arriving from the east. Traffic to and from the west

would be accommodated at a T-type signalized intersection located at the west end of the new roadway. Left-turn movements to the east on Route 101 would be prohibited.

No improvements would be needed at the three signalized intersections that would remain along the old Route 101 alignment. However, a center left-turn lane should be provided along the old alignment between Wilton Road and Route 101A to accommodate turns into the existing commercial uses.

Wilton (Greenville Road/ Route 31 South to Old Wilton Road)

The volume of traffic in Wilton is less than other segments of the corridor and for that reason can operate acceptably for much of the 20-year design period without widening the roadway to a four-lane cross-section. However, what is needed and is recommended is to widen the shoulders to the standard 10 foot width, to improve sight lines and intersection geometry at the side streets and driveways, and to provide center left-turn lanes to accommodate turns into the more significant traffic generators such as the town's recycling center, Mansur Road, and local businesses along the corridor.

Conclusions

The results of the operational analyses comparing the future without and with improvements is presented in *Tables 1 and 2*.

Table 1

Signalized Intersection Capacity Analysis Summary 2021 Future Condition – With and Without Improvements												
Intersection with Route 101	Without Improvements						With Improvements					
	Weekday AM Peak Hour v/c ⁺	Delay [*]	LOS ^{**}	Weekday PM Peak Hour v/c	Delay	LOS	Weekday AM Peak Hour v/c	Delay	LOS	Weekday PM Peak Hour v/c	Delay	LOS
Greenville Road	-	-	-	-	-	-	0.87	26	C	0.77	20	C
Old Route 101	-	-	-	-	-	-	0.54	8	A	0.83	17	B
Wilton Road ¹	1.09	65	E	1.15	84	F	0.79	28	C	0.97	51	D
Route 101A (Elm Street)/North River Road	1.20	101	F	0.96	51	D	0.65	24	C	0.65	25	C
Old Wilton Road/Phelan Road	1.14	100	F	1.16	125	F	0.69	28	C	0.81	39	D
NH 13 EB Ramp	-	-	-	-	-	-	0.55	14	B	0.64	15	B
NH 13 WB Ramp	-	-	-	-	-	-	0.63	22	C	0.68	23	C
Route 101A EB Ramps	-	-	-	-	-	-	1.03	40	D	0.72	21	C
Route 101A WB Ramp ²	0.68	25	C	0.71	27	C	0.48	9	A	0.56	9	A

⁺ Volume to capacity ratio
^{*} Average delay per vehicle (in seconds)
^{**} Level of Service
¹ Includes timing improvement
² 2021 Analysis includes Richmond development mitigation

The results show that, with the proposed improvements in place, each of the corridor's signalized intersections would operate at an acceptable level of service under the future year condition. This includes the four existing signalized intersections as well

Table 2

Unsignalized Intersection Capacity Analysis Summary
2021 Future Condition – With and Without Improvements

Intersection with Route 101	Movement	Without Improvements						With Improvements					
		Weekday AM Peak Hour			Weekday PM Peak Hour			Weekday AM Peak Hour			Weekday PM Peak Hour		
		Demand ⁺	Delay [*]	LOS ^{**}	Demand	Delay	LOS	Demand	Delay	LOS	Demand	Delay	LOS
NH 31S (Greenville Road)	WB Left	160	13	B	365	12	B	-	-	-	-	-	-
	NB Lanes	385	561	F	245	#	F	-	-	-	-	-	-
NH 31N/Abbott Hill Road	EB Left	110	9	A	80	12	B	110	9	A	80	12	B
	WB Left	95	12	B	65	10	A	95	12	B	65	10	A
	NB Lane	195	#	F	75	#	F	-	-	-	-	-	-
	SB Lane	125	#	F	200	#	F	-	-	-	-	-	-
	NB LT/TH	-	-	-	-	-	-	75	#	F	30	#	F
	NB Right	-	-	-	-	-	-	120	39	E	45	16	C
	SB LT/TH	-	-	-	-	-	-	60	#	F	85	#	F
	SB Right	-	-	-	-	-	-	65	14	B	115	39	E
Route 101 WB Ramps/NH 13	NB Left	140	9	A	170	9	A	-	-	-	-	-	-
	WB Lane	350	381	F	565	#	F	-	-	-	-	-	-
Route 101 EB Ramps/NH 13	SB Left	115	12	B	95	11	B	-	-	-	-	-	-
	EB Lane	205	68	F	190	159	F	-	-	-	-	-	-
Route 101 WB Spur/Route 101A	NB Right	310	15	C	160	11	B	-	-	-	-	-	-
Route 101 EB Ramps/Route 101A	NB Left	95	27	D	215	18	C	-	-	-	-	-	-
	EB Left	45	#	F	60	#	F	-	-	-	-	-	-
	EB Right	1160	724	F	700	42	E	-	-	-	-	-	-
Route 101 EB Off ramp/NH 122	NB Left	15	16	C	65	16	C	15	16	C	65	16	C
	NB Right	5	13	B	5	10	A	5	13	B	5	10	A
Route 101 WB On ramp/NH 122	WB Left	5	9	A	5	8	A	5	9	A	5	8	A
Route 101 EB Ramps/Amherst Street (NH 122)	EB Lane	625	12	B	400	9	A	705	12	B	420	9	A
	NB Lane	25	43	E	80	21	C	25	36	E	80	19	C
NH 101 WB Ramps/Amherst Street (NH 122)	WB Lane	90	10	A	35	9	A	90	10	A	35	9	A
	SB Lane	355	15	B	650	42	E	-	-	-	-	-	-
	SB Left	-	-	-	-	-	-	100	39	E	70	18	C
	SB Right	-	-	-	-	-	-	335	11	B	600	20	C
The Meeting Place Driveway	SB Left	80	19	C	20	14	B	-	-	-	-	-	-
	WB Left	80	#	F	105	#	F	-	-	-	-	-	-
	WB Right	90	171	F	65	60	F	170	118	F	170	42	E
Walnut Hill Road	SB Lane	5	14	B	20	15	B	-	-	-	-	-	-
	WB Lane	95	#	F	50	#	F	-	-	-	-	-	-
	WB Right	-	-	-	-	-	-	20	17	C	15	19	C
	EB Right	-	-	-	-	-	-	155	23	C	140	23	C
Town Transfer Station ¹ ¹ Saturday 9:00-11:00AM	NB Left	240	14	B	-	-	-	240	14	B	-	-	-
	EB Lane	305	#	F	-	-	-	-	-	-	-	-	-
	EB Left	-	-	-	-	-	-	45	74	F	-	-	-
	EB Right	-	-	-	-	-	-	260	22	C	-	-	-
Horace Greeley Road	NB Left	65	13	B	165	17	C	-	-	-	-	-	-
	EB Lane	285	#	F	160	#	F	-	-	-	-	-	-
	EB Right	-	-	-	-	-	-	235	30	D	135	23	C

⁺ Demand of vehicles during the peak hour

^{*} Average delay per vehicle (in seconds)

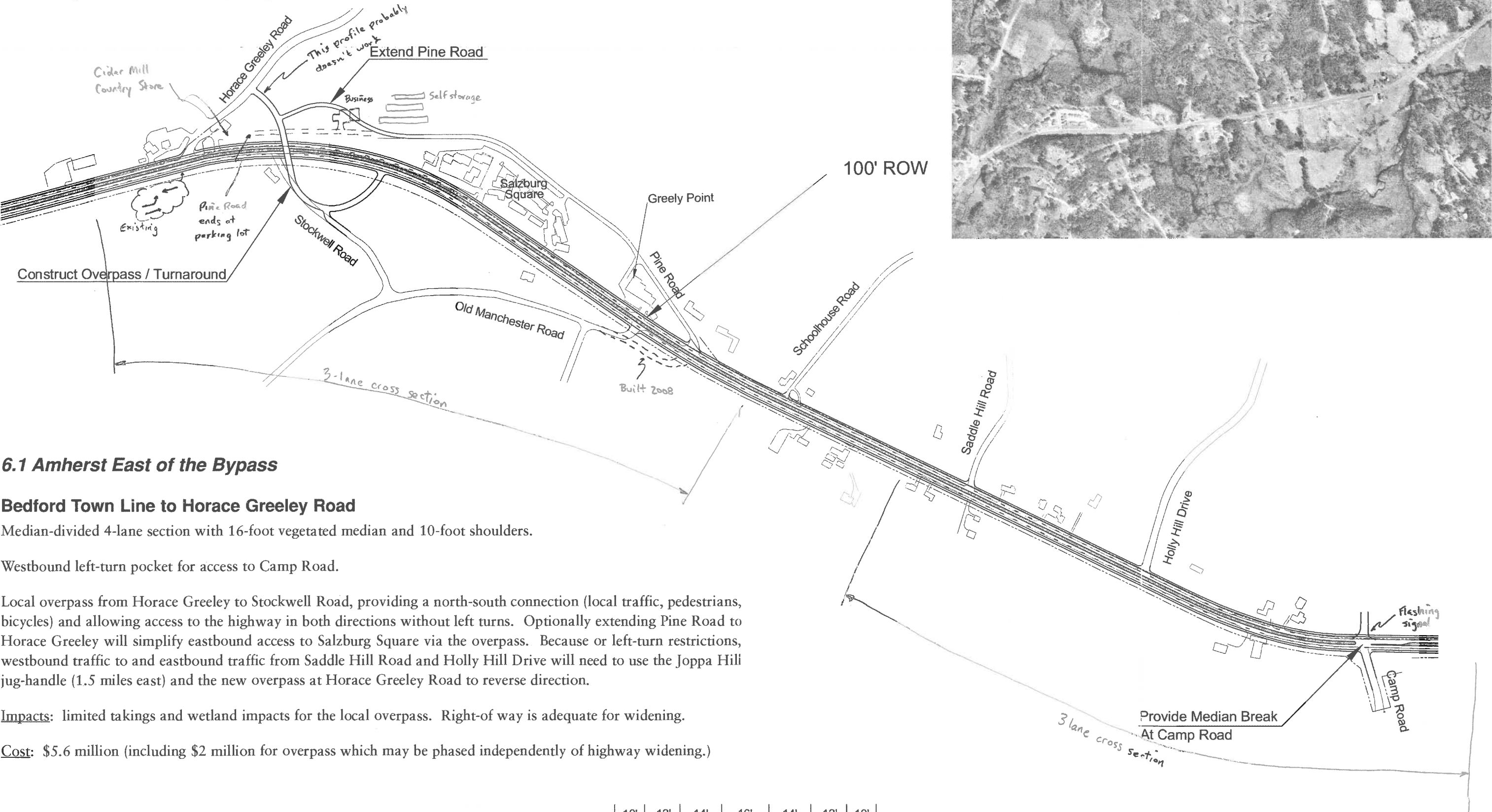
^{**} Level of Service

Delay greater than 999 seconds

as the five locations where traffic signal control is proposed. The overall corridor will operate substantially better and safer with the proposed improvements in place. However, particular movements at some of the unsignalized corridor intersections are expected to continue to operate poorly (LOS E or F). These locations include side streets such as Abbott Hill Road in Wilton, and the Meeting Place and the Town Transfer Station in Amherst.

Installation of a traffic signal should be considered at the Abbott Hill Road intersection. However, the long-term solution for this intersection should be considered within the context of the long-term plan for the corridor west of Wilton. The right-turn movement from the Meeting Place, despite operating at a poor level of service, reflects an improved operation with the elimination of left-turn movements. The left-turn exiting movement from the Transfer Station in Amherst will experience long delays. However, this volume is relatively low as most Amherst residents enter and exit the facility to and from the west. To address the delays experienced by motorists destined to the east, the town should consider providing a secondary access to the Transfer Station that could connect to Austin Road and to Horace Greeley Road.

6.0 Proposed Roadway Improvements



6.1 Amherst East of the Bypass

Bedford Town Line to Horace Greeley Road

Median-divided 4-lane section with 16-foot vegetated median and 10-foot shoulders.

Westbound left-turn pocket for access to Camp Road.

Local overpass from Horace Greeley to Stockwell Road, providing a north-south connection (local traffic, pedestrians, bicycles) and allowing access to the highway in both directions without left turns. Optionally extending Pine Road to Horace Greeley will simplify eastbound access to Salzburg Square via the overpass. Because of left-turn restrictions, westbound traffic to and eastbound traffic from Saddle Hill Road and Holly Hill Drive will need to use the Joppa Hill jug-handle (1.5 miles east) and the new overpass at Horace Greeley Road to reverse direction.

Impacts: limited takings and wetland impacts for the local overpass. Right-of way is adequate for widening.

Cost: \$5.6 million (including \$2 million for overpass which may be phased independently of highway widening.)

10'	12'	14'	16'	14'	12'	10'
	↓	↓		↑	↑	

NH 101 Cross Section

Vanasse Hangen Brustlin, Inc.

Horace Greeley Road to Amherst Street

Median-divided 4-lane section with 16-foot vegetated median and 10-foot shoulders

Reconstructed Amherst Street/Baboosic Lake Road interchange, providing better acceleration and deceleration transitions.

Eastbound left-turn pocket for solid waste transfer station; (most access is currently right-turn in and out). => Done

Preferred option for access at Walnut Hill Road and Blueberry Hill Road: provide a parallel service road north of Route 101, extending from Limbo Lane, connecting to Blueberry Hill Road, and crossing over the highway to Walnut Hill Road on a local overpass. A connector to Route 101 would provide right-turn access. This system would provide Walnut Hill Road and Old Manchester Road safe westbound access while retaining right-turn access in the eastbound direction. Blueberry Hill Road would have eastbound access via the Amherst Street interchange. The Meeting Place would have westbound access via the Amherst Street interchange;

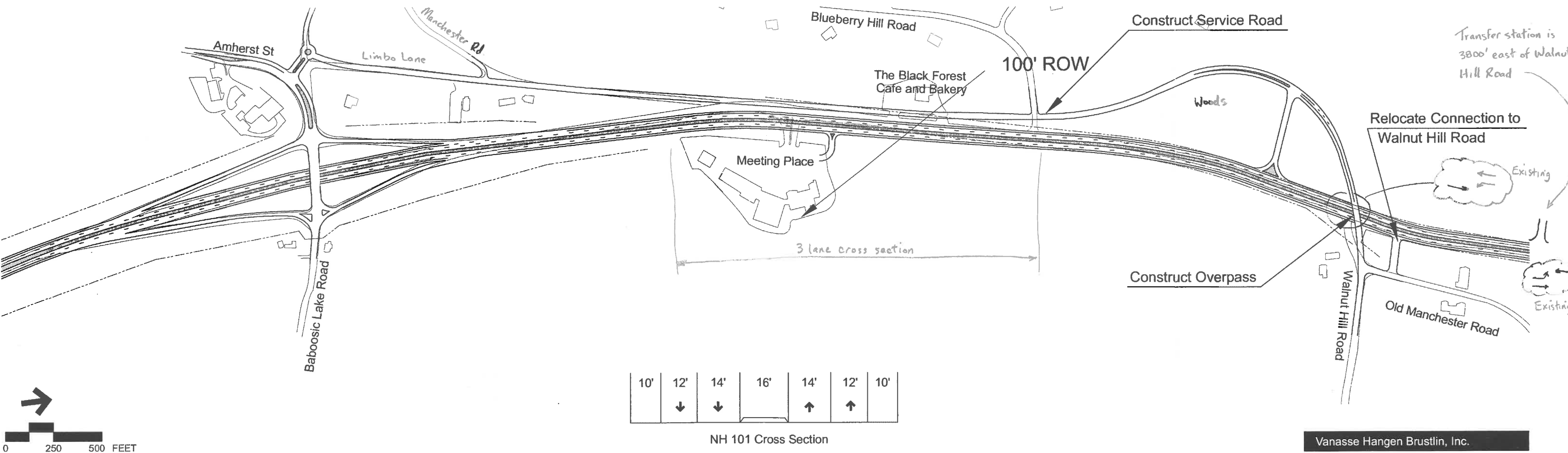
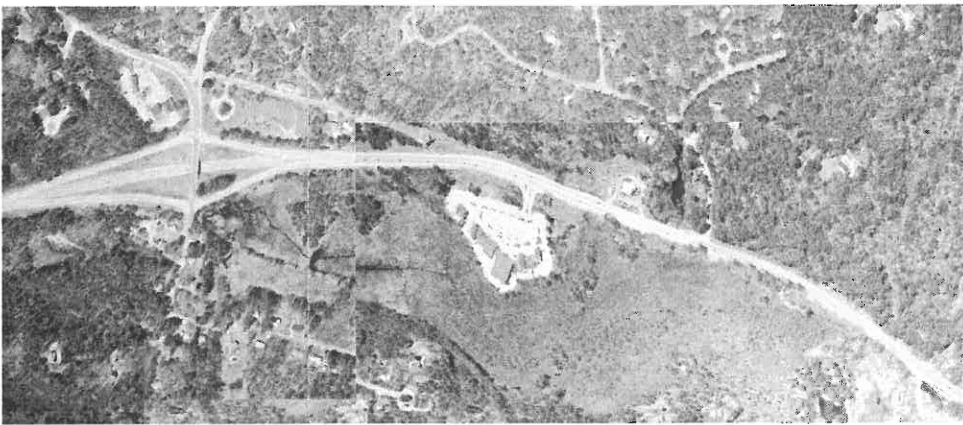
for egress from the Meeting Place to the west, an additional connection would be required where the local overpass connects to Walnut Hill Road; this may or may not be justifiable based on cost.

Impacts: Additional right of way is required for the service road, including a portion of the parking area in front of the Black Forest bakery restaurant. There are limited wetland impacts on the small pond near Blueberry Hill Road.

Cost: \$9.6 million (including \$2 million for overpass which may be phased independently of highway widening).

Other alternatives considered: Route 101 cannot be widened to the south because of extensive wetlands. A feasible but less preferable alternative is to reconstruct the highway north of the existing alignment and to use the existing pavement for local access between the Amherst Street interchange and Walnut Hill Road. This option would involve a much larger

and more expensive structure, would require a full taking of the Black Forest bakery/restaurant, and would have more severe impacts on the pond near Blueberry Hill Road. It would provide better access to the Meeting Place via the Amherst Street interchange. Cost: 12.6 million.



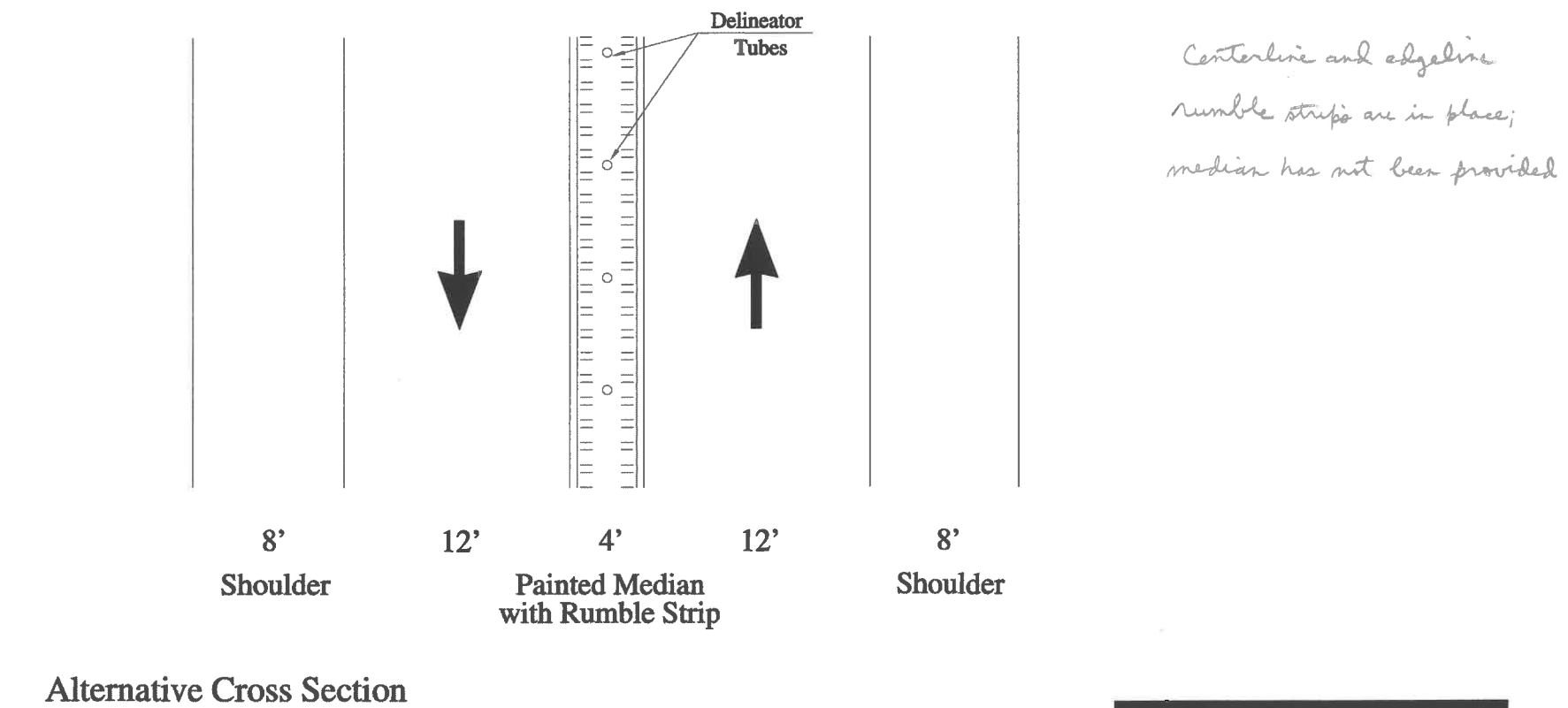
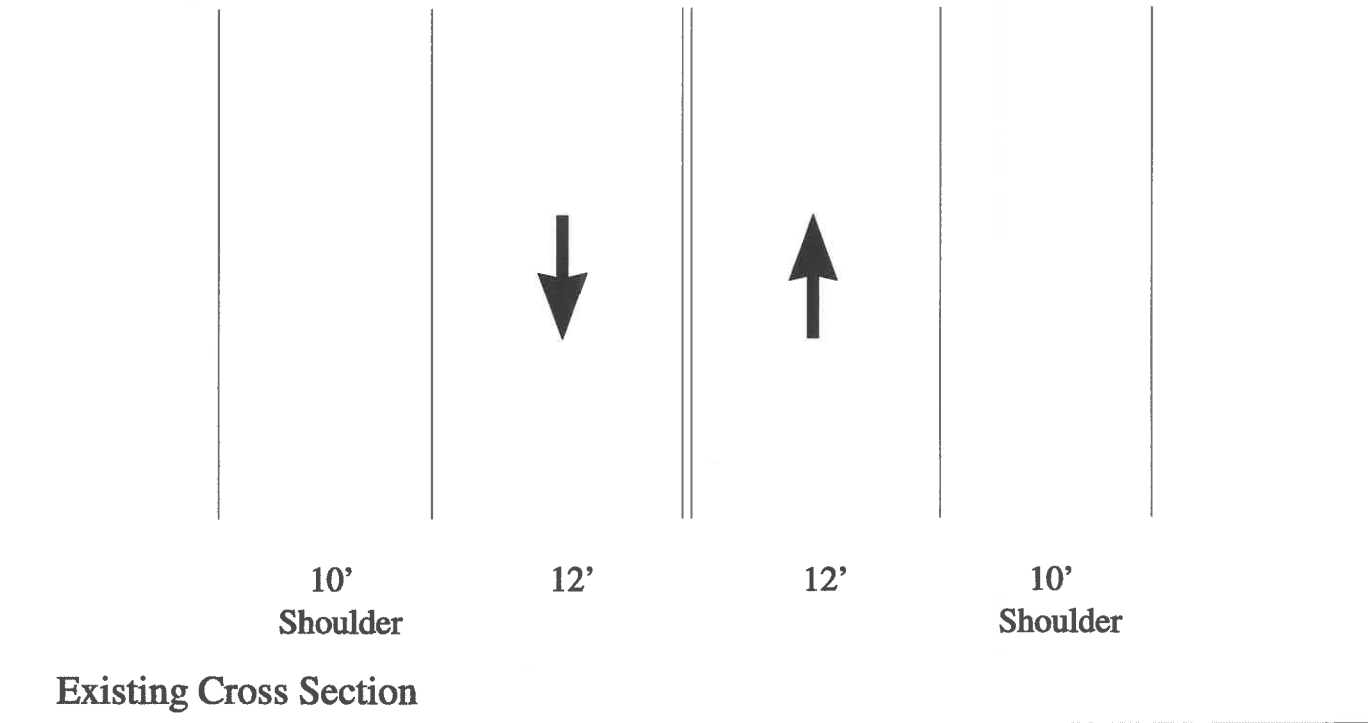
6.2 Bypass in Milford and Amherst

West of Amherst Street Interchange to western Milford:
Short/Medium Term

The Route 101 Bypass is currently experiencing severe head-on collisions and averaging nearly one fatal accident per year, which is approximately twice the statewide average on a lane-mile basis. The apparent cause of these accidents is driver inattention. An immediate action program includes fixed and variable message signage to alert drivers and increased enforcement.

A more complete solution requires greater separation of the opposing travel lanes, which will be accomplished in the long-term by a median-divided 4-lane cross-section. However, an interim solution with substantially lower cost is also recommended. This would involve shifting the travel lanes two feet on each side of the road, occupying a portion of the current shoulder. A 4-foot painted median would be created, providing a margin of safety that is expected to substantially reduce crossover accidents. Shoulders would be reduced in width from 10 feet to 8 feet. Rumble strips are recommended on each edge of the painted median to alert drivers who are drifting toward the oncoming lane. Installation of a line of reflector-covered plastic delineator tubes should be considered for the center of the painted median. These have been successfully used in similar situation such as the undivided portion of Route 6 on Cape Cod. In order to implement this interim solution, it is necessary to increase the pavement thickness of the highway shoulders. This can be accomplished by providing a one to two-inch pavement overlay for the full width of the highway between Route 101A and the western end of the bypass.

This interim solution raises issues such as a non-standard highway cross-section, snow removal if delineator tubes are used, and the use of rumble strips on the left edge of the travel lane. However, the urgency of the safety situation requires an interim solution.



Vanasse Hangen Brustlin, Inc.

West of Amherst Street Interchange to western Milford:
Long Term Improvements

Route 101A Interchange

This interchange will require modification when the highway is widened. Better acceleration and deceleration transitions at the ramps will improve traffic flow and safety. In addition, improvements are needed at the ramp connections to Route 101A where traffic currently queues at a traffic signal at the westbound on-ramp, and queues on the eastbound off-ramp often extend back onto the highway.

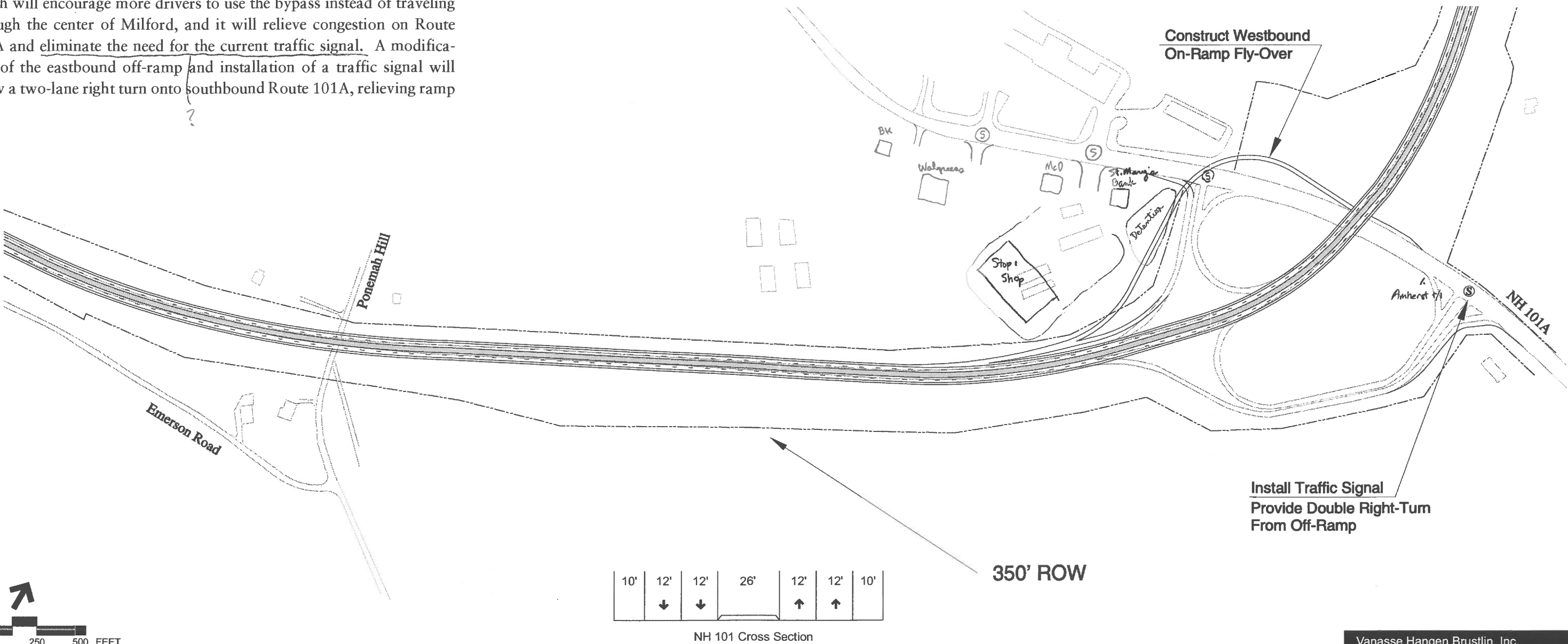
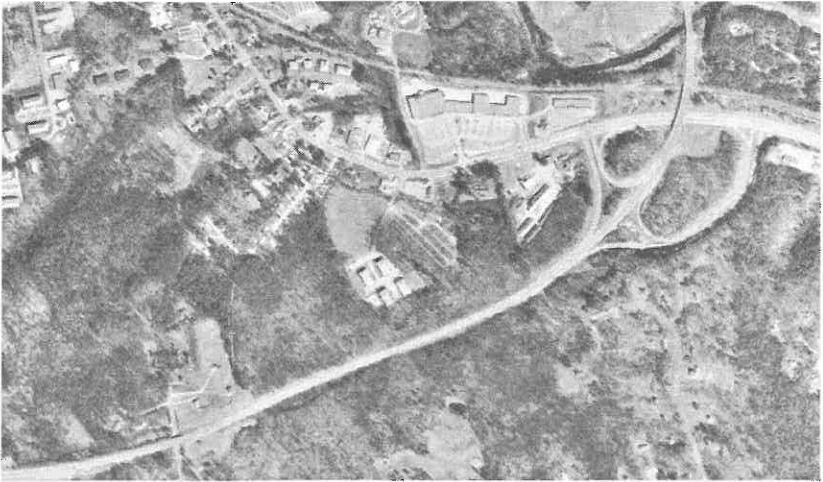
A flyover ramp is recommended from ^{westbound?} ~~northbound~~ Route 101A to the westbound Route 101 bypass. This ramp will allow a free movement which will encourage more drivers to use the bypass instead of traveling through the center of Milford, and it will relieve congestion on Route 101A and eliminate the need for the current traffic signal. A modification of the eastbound off-ramp and installation of a traffic signal will allow a two-lane right turn onto southbound Route 101A, relieving ramp

queues.

Impacts: Some right-of way for the fly-over ramp is needed from a planned commercial development located west of the existing on ramp. To limit any potential impact to the site's parking and traffic circulation, a retaining wall would likely be needed.

Cost: Modifications to accept 4-lane cross-section: \$2 million.

Westbound flyover on-ramp and signalized intersection at eastbound off-ramp: \$3 million.



West of Amherst Street Interchange to western Milford: Long Term Improvements

Cross-section

To achieve acceptable level of service, the cross-section of the bypass should be increased to two travel lanes in each direction with a 26-foot vegetated median and 10-foot shoulders. Right-of-way is adequate to accommodate the widening.

Impacts: none

Cost: \$18.7 million.

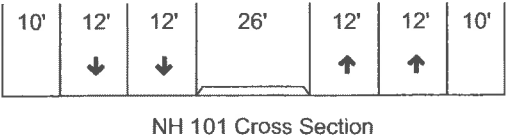
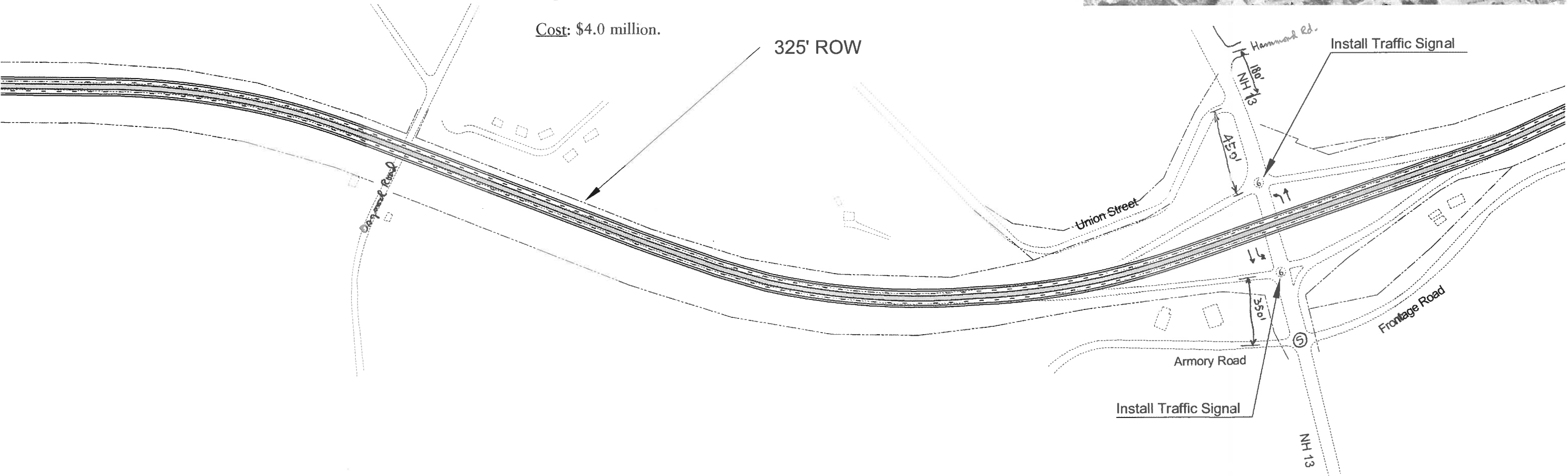
Alternatives Considered: Interest was expressed in public meetings for providing a full interchange at Ponemah Road, which would encourage some traffic to and from the north and east to exit here instead of at Amherst Street. However, substantial wetland impacts would occur, and anticipated use of these new interchange connections are not large enough to justify impacts and cost.

Route 13 Interchange

This interchange will also require modification to accommodate the 4-lane bypass cross-section. To relieve congestion and improve safety, it is recommended that traffic signals be installed where the interchange ramps intersect Route 13.

Impacts: none.

Cost: \$4.0 million.



Vanasse Hangen Brustlin, Inc.

6.3 Transition from Western Milford to Wilton

This “bottleneck” area currently includes traffic signals at Old Wilton Road, Route 101A, and Wilton Road, as well as two railroad crossings. Traffic congestion occurs at these intersections and along the commercial strip between the railroad and the Souhegan River, where there is ~~this in~~ not enough room to widen to the four lanes needed to accommodate the projected traffic volumes.

The recommended solution would extend the bypass from the existing curve, around the north side of Dram Cup Hill rejoining the existing alignment east of the town line. The existing topography in the area is relatively steep. However, results of a preliminary investigation suggest that the vertical grades along the new roadway can be limited to 4 percent or less.. Assuming that a 2-lane cross-section would be retained in Wilton, the cross-section would make a transition from four lanes to two near the eastern end of the bypass extension. Slip ramps connecting with the existing alignment would provide access to and from the east. Access to and from the west would be provided by a short connector road making a signalized T-intersection with the highway or via the existing alignment. (No left turns to eastbound Route 101 would be permitted at this connector intersection.)

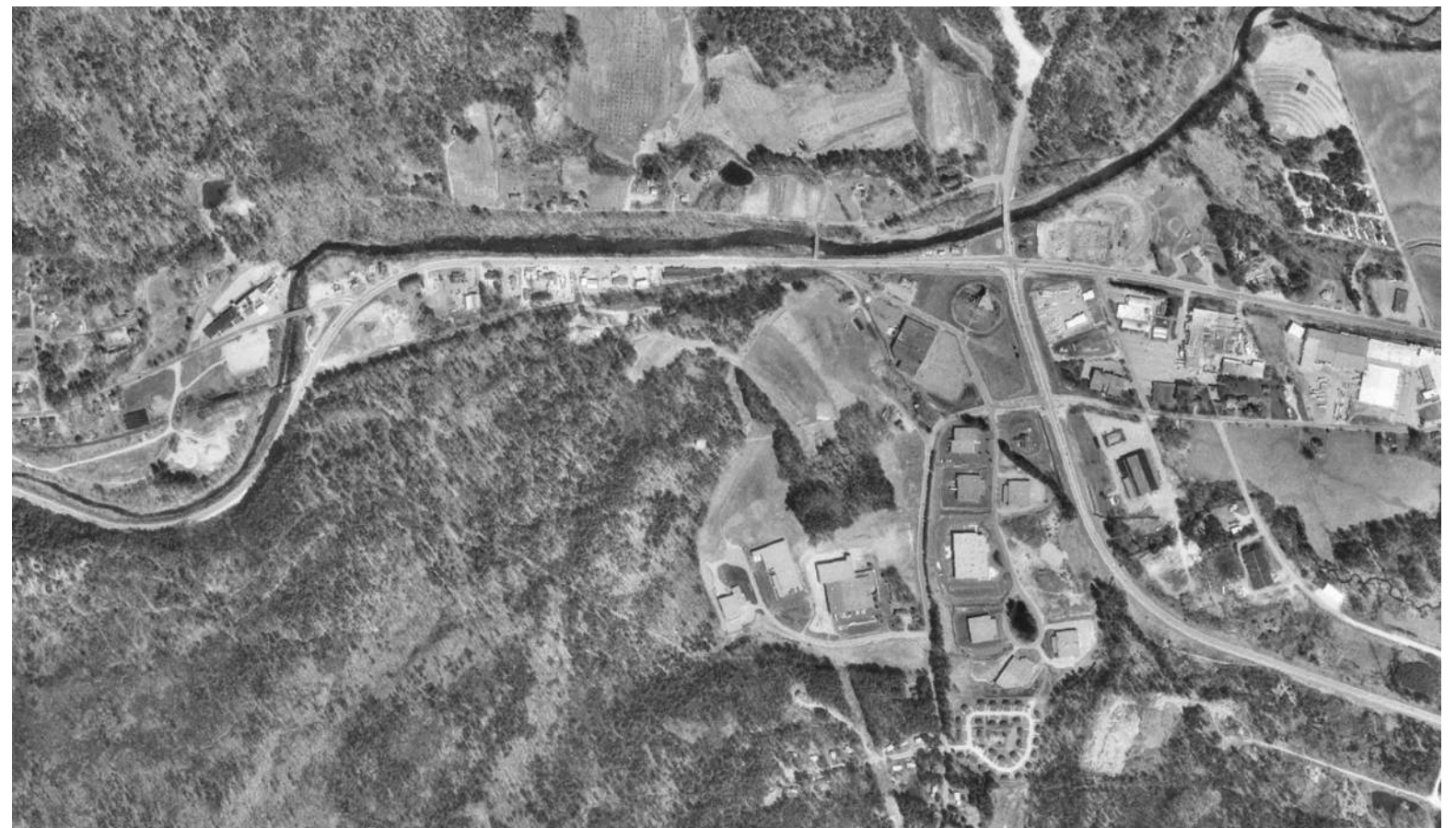
At the time of design, consideration should be given to continuing the four-lane cross section of the Bypass to or through the signalized intersection. In either case, this new section of roadway should be designed so as to make a transition from the higher type design of the Bypass to the narrower section in Wilton.

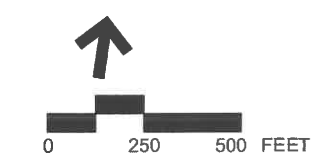
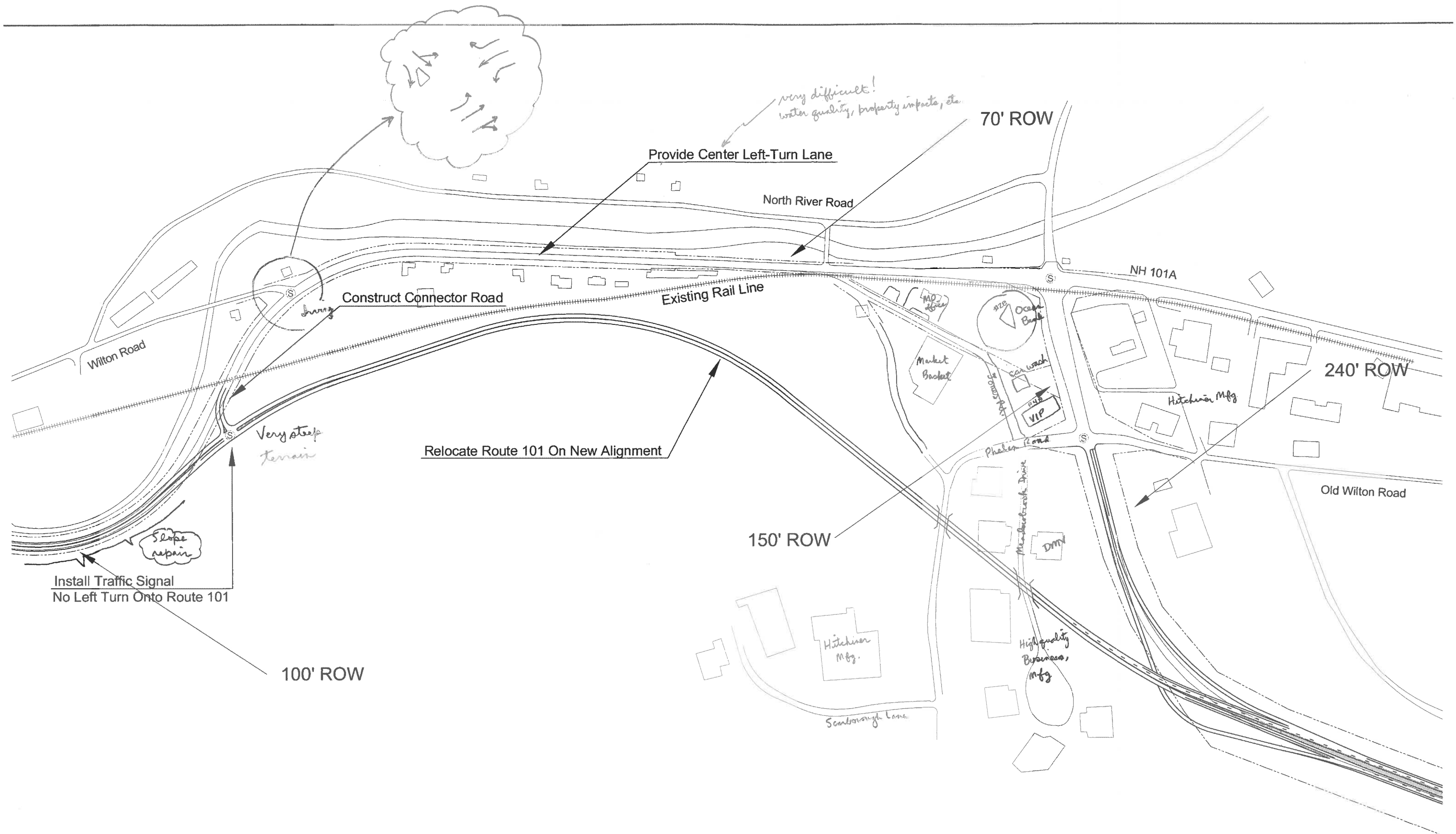
This solution provides excellent access to the existing industrial and commercial district in western Milford, including the BROX property whose access is via the Old Wilton Road intersection. The existing commercial strip would receive less drive-through traffic but would be more accessible because congestion would be relieved and a center turn lane can then be accommodated. The existing traffic signals would operate with good levels of service beyond the 20-year planning horizon.

Impacts: A structure would pass over the Meadowbrook Industrial Park, and one building would need to be fully or partially taken; circulation in the industrial park would not be impaired. Right-of way for the bypass extension would be required, and a small structure on Dram Cup Hill would be taken. The commercial strip along existing Route 101 would be easily accessible, minimizing revenue losses due to reduced traffic.

Cost: \$5.2 million.

Alternatives considered: Widening of the existing alignment through this area would necessitate takings of several businesses in the commercial strip, potential impacts to the bank of the Souhegan River, and major modifications to the signalized intersections, which would continue to be heavily congested. Routing eastbound traffic on an improved North River Road was considered, but very steep grades make this option infeasible; there would also be residential impacts and a new river crossing.





6.5 Improvements in Wilton

Projected traffic volumes in Wilton are lower than the rest of the Corridor, and the projected operations in 20 years would function at LOS E. However, because the projected condition exceeds the acceptable criterion of LOS D by only a small margin, the preferred option is to retain two lanes, while providing 10-foot shoulders and improving sight lines and intersection geometry and managing new access in the commercial industrial area at the west end of the corridor. Sight lines would be improved at the entrance to Abbott Hill Acres by cutting back the slope and vegetation in this area. East Intervale Road, which now has two highly skewed intersections with the highway, would be given a single access connector with good geometry. Center left-turn lanes would be provided at key turning locations, such as the transfer station and access routes to the Monadnock Spring Water facility.

Improvement and signalization of the Greenville Road (NH Route 31 South) intersection is also recommended.

Uncontrolled left-turn movements from Abbott Hill Road and from NH Route 31 North will continue to experience delay. Given the geometric

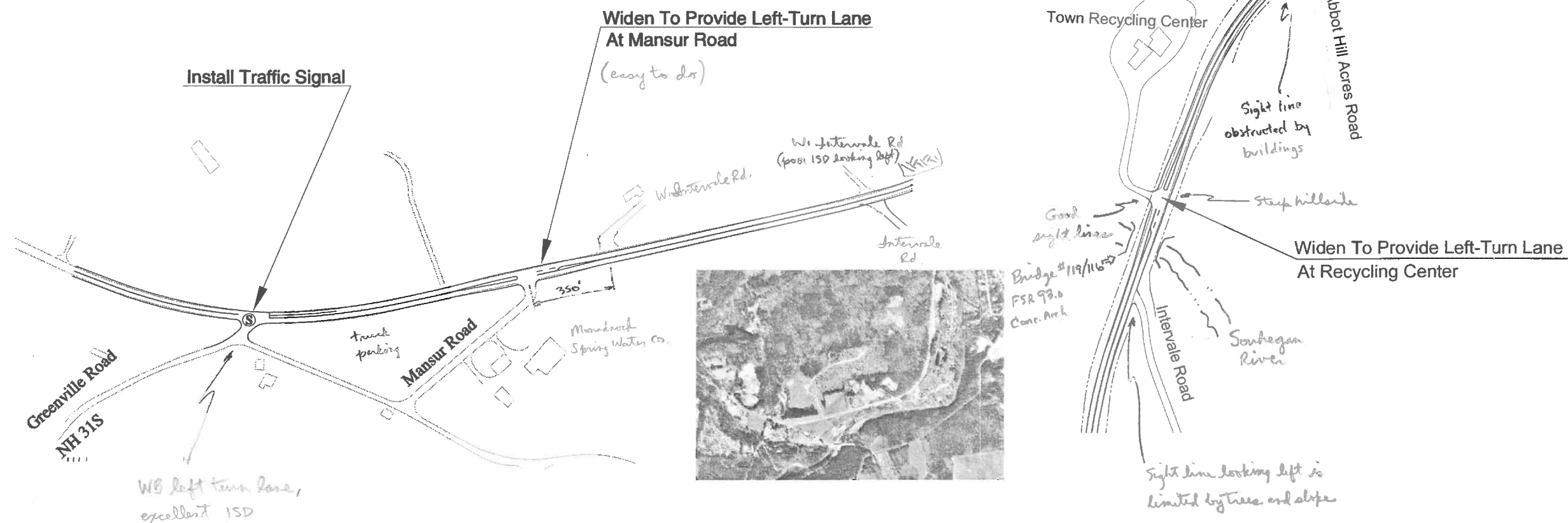
constraints at the intersection, the installation of traffic signal control at this location is not preferred, although it may become necessary. It is recommended that that this intersection, as well as this section of the corridor, be re-evaluated as part of any future planning study of Route 101 west of Wilton.

Wilton's zoning already has provisions for managing access to Route 101, limiting curb cuts and encouraging shared access and linked parking lots. Provision of a center left-turn lane should be considered during development review.

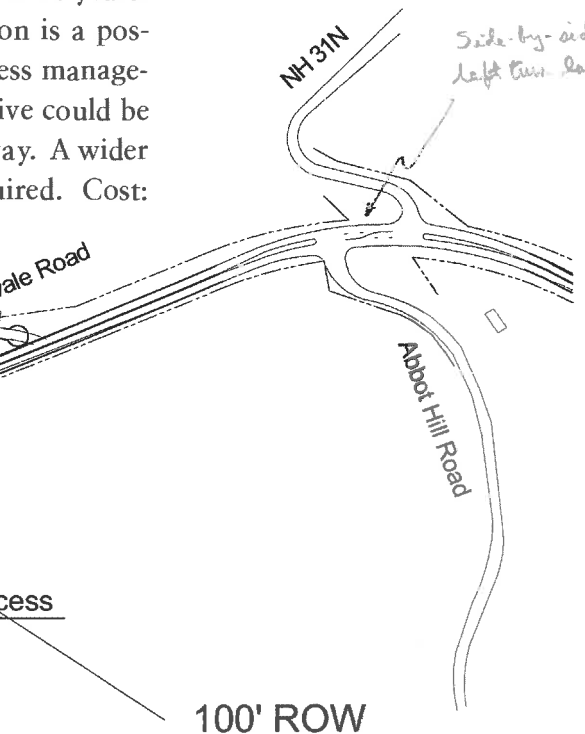
Impacts: minor takings are necessary for intersection improvements and east Intervale connection.

Cost: \$4.5 million.

Other alternatives considered: As noted, a two-lane cross-section would result in borderline levels of service in 20 years. Widening to a 4-lane median divided cross-section is a possible alternative, depending on the success of access management over the next 10 to 20 years. This alternative could be accommodated in the existing 100-foot right-of-way. A wider structure over the Souhegan River would be required. Cost: \$6.0 million.



NH 101 Cross Section



Vanasse Hangen Brustlin, Inc.

6.5 Pedestrian and Bicycle Improvements

Amherst, Milford, and Wilton already have good pedestrian environments in Amherst Village, the Oval, and downtown Wilton. The regional bicycle network is largely independent of Route 101, crossing under the highway's bypass section. Nonetheless, there are potential improvements that can serve these non-motorized modes of transportation better. The TCSP study described in Section 3.2 will address pedestrian and bicycle transportation and will make additional recommendations regarding these modes.

6.5.1 Western Milford

The extension of the Route 101 bypass will substantially reduce traffic in this area, making the former Route 101 from Old Wilton Road to Wilton Road more suitable for bicycles. The guidelines developed for the BROX property call for a multi-use path providing pedestrian and bicycle circulation throughout the proposed industrial park, and it is expected that employees of the business in the area will use this path system. The development of BROX will increase the employee density of the area, and the improved traffic may also stimulate development of restaurants and shopping opportunities. Therefore, the existing signalized intersections should provide for actuated pedestrian signal phases to allow and encourage pedestrians to better utilize the area. A sidewalk on at least one side of Perry Road and Old Wilton Road would help to accommodate pedestrian movement.

6.5.2 Wilton

The improvement of shoulders and substandard intersections in Wilton will make this area more suitable for bicycles. It is suggested that sidewalks be provided by property owners in the industrial area east of Greenville Road as this area develops over the coming decades.

6.5.3 Amherst

The proposed local overpasses at Walnut Hill Road and Horace Greeley Road will provide routes for pedestrians and bicycles to cross the highway safely, which may encourage more pedestrian and bicycle travel to neighborhoods on the opposite side of the highway and to businesses accessible by the proposed service road connections. Pedestrian and bicycle accommodation should be among the design criteria for these improvements.

6.6 Corridor Aesthetics

6.6.1 Roadway Landscaping

Good frontage landscaping should be required of commercial and industrial development along Route 101 as described below. Within the public right-of-way, planted areas occur in the median of the highway and at interchanges.

Because of the nature of the bypass section, the 26-foot median is probably best treated as a grassy area. In Amherst north and east of the bypass, the 16-foot median area might include both grass and low shrubs or wildflowers keeping with the rural character of this portion of the corridor and consistent with similar potential treatments in the western portion of Bedford. A low maintenance treatment is necessary (minimizing trees and shrubs that require pruning), particularly if responsibility for maintenance of the median is to be assumed by New Hampshire DOT. If used, shrubs should be grouped at key locations along the corridor such as interchanges and well-mulched to minimize the growth of weeds. Recommended plant materials are listed below.

This approach is more costly to maintain than a curbed bituminous or Portland cement concrete median, but hard surfaced highway medians quickly become unsightly places for sand and debris to collect and weeds to grow through cracks in the surface. Mowed grass is the minimum acceptable treatment in terms of aesthetics. In areas such as narrow traffic islands where mowing may be difficult, alternative plantings such as low shrubs or wildflowers may be used. These planted areas should be well-mulched to minimize the growth of weeds. Cobbles set in mortar can also be used to provide a more attractive hard surfaced treatment for these small areas.

6.6.2 Landscaped Gateways

In contrast to the median, it is recommended that more intensive gateway landscaping should be installed at key locations, signaling the transition from the highway system to the local street system and welcoming visitors to the town. Potential locations for gateway landscaping

- Amherst Street interchange
- Route 101A at the interchange ramps
- Route 13 interchange
- Old Wilton Road intersection at the ends of the slip ramps
- Perry Road entrance to the BROX development

- Wilton connection to the bypass extension
- Greenville Road (Route 31 south) intersection in Wilton, entering industrial district.

Combinations of a canopy tree and an understory tree or shrub are suggested, such as white pine with paper birch (used in the Amherst Street interchange example) or red oak and witch hazel. Native flowering trees and shrubs can also be used, as in the Route 13 interchange example. Milford granite can be used to provide interest to the design in the form of low stone walls or bollards, which may be used for mounting welcoming signage.

The design must maintain clear sight lines at the ends of interchange ramps and provide adequate setback of trees and granite elements to meet safety criteria.

Two examples of gateway landscaping design using native trees and granite are illustrated for the Amherst Street interchange and the Route 13 interchange.

6.6.3 Recommended Plant List

The following table lists commonly available landscape plants which are suited to the southern New Hampshire climate and a highway setting.

6' wide planting strip along edge of roadway

Medium sized Trees (do not conflict with overhead utility wires)

Imperial Honeylocust - *Gleditsia triacanthos* 'Impcole'
 American Hornbeam - *Carpinus caroliniana* (tree form)
 Columnar Sargent Cherry – *Prunus sargentii* 'Columnaris'
 Macho Amur Corktree – *Phellodendron amurense* 'Macho'
 Regent Japanese Tree Lilac - *Syringa reticulata*
 Japanese Black Pine – *Pinus thunbergiana*
 Pitch Pine – *Pinus rigida*
 Western Red Cedar – *Juniperus virginiana*

Groundcover

Grass seed mix. Blend of Fescue, Kentucky Bluegrass and Ryegrass

14' to 26' wide planted roadway median

Shade or Stand-Alone Trees

Shademaster Honeylocust - *Gleditsia triacanthos* 'Shademaster'
 Red Maple 'Red Sunset' – *Acer rubrum* 'Red Sunset' (20' wide median)
 Red Maple 'Armstrong' – *Acer rubrum* 'Armstrong' (14' wide median)
 Littleleaf Linden – *Tilia cordata*
 Skymaster English Oak – *Quercus robur* 'Pyramich'

Scotch Pine – *Pinus sylvestris*
Austrian Pine – *Pinus nigra*
Eastern White Pine – *Pinus strobus* (for locations not directly exposed to road salt)

Flowering Trees

Regent Japanese Tree Lilac - *Syringa reticulata* (20' wide median)
Amelanchier x graniflora 'Autumn Brilliance' - *Autumn Brilliance Serviceberry*
(20' wide median – tree form)
Cleveland Select Pear – *Pyrus calleryana* 'Chanticleer' (20' and 14' wide median)
Columnar Sargent Cherry – *Prunus sargentii* 'Columnaris' (20' and 14' wide median)
Crimson Cloud English Hawthorn – *Crataegus laevigata* 'Superba' (thornless tree form)

Shrubs

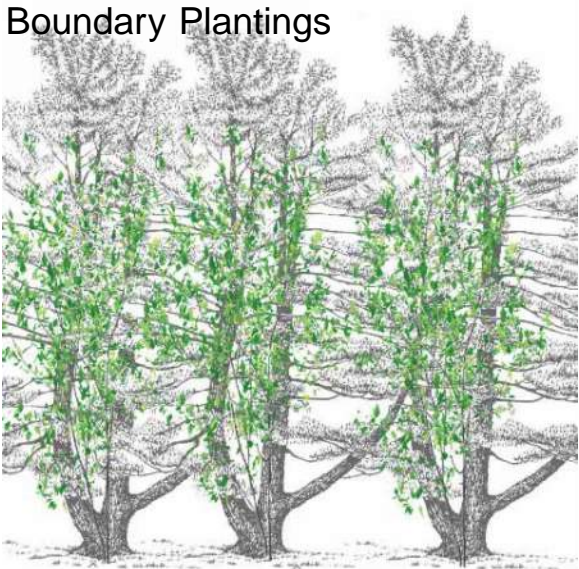
Rugosa Rose - *Rosa rugosa*
Fragrant Sumac - *Rhus aromatica*
Mugo Pine 'Mugo' - *Pinus mugo* 'mugo'
Chinese Juniper 'Hetzii' - *Juniperus chinensis* 'hetzii'
Winged Euonymus 'Rudy Haag' - *Euonymus alatus* 'rudy haag'
Dwarf Fothergilla - *Fothergilla gardenii*
Mugo Pine – *Pinus mugo*
Large Fothergilla - *Fothergilla major*

Groundcover

Grass seed mix. Blend of Fescue, Kentucky Bluegrass and Ryegrass

Landscaped Gateways: Amherst Street Interchange

Route 101 Amherst Interchange and Context



Landscaped Gateways: Route 13 Interchange



Wildflower and native grass seed mixes along the highway add color and diversity to the landscape.



6.7 Development Guidance and Review

6.7.1 Land Use and Development

The three corridor towns already have good development regulations in place and provide thorough site plan review of proposed development. Route 101 does not pass through the centers of the towns, and except in Wilton, west of the Souhegan River, there are few opportunities for new development with frontage on Route 101. Therefore, additional guidelines are unnecessary. (Guidelines have been developed for the BROX industrial development site to optimize development potential and quality, but for the most part, the BROX property is not highly visible from the highway and these BROX guidelines affect views from the highway corridor primarily by requiring existing trees to be retained to the extent possible.)

It remains important for the town planning boards and planning staff to emphasize access management and landscaping along the highway for both traffic safety/traffic flow and aesthetics. Property owners should be made aware of the future plans to provide a median divider limiting left turns. Planning boards should require commercial development to provide a center left-turn lane on an interim basis at locations where turns are appropriate. Boards should also consider requiring driveway entrances to be designed to prohibit outbound left turns from the property onto the highway.

In Wilton, the existing zoning provisions should be used to require shared driveways and effective landscaping of the front setback area. For commercial development, the front setback (from which parking is excluded) should be landscaped to separate the building from the roadway but not fully screen it. Some taller shade trees should be incorporated in the landscaped area as well as lower plantings. This type of design is more aesthetic and in keeping with the character of the corridor than, for example, a uniform row of screening shrubs such as closely spaced arbor vitae. For industrial development, the front setback is 100 feet from Route 101 (75 feet from side streets) and use of native woodland trees to achieve more complete separation from the highway is appropriate. Existing trees should be retained to the extent possible.

It is recommended that in design review the effectiveness of proposed planting plans should be evaluated against a stated objective, such as:

“The front setback area should be well landscaped with a combination of ground cover, shrubs and shade trees of sufficient size and density to visually separate the building from the roadway create an aesthetically pleasing roadway edge. The landscaping should provide views through the landscaped area to the building and parking areas rather than screening them from view.”

Proposed designs should be revised as necessary to achieve the design objective. This approach encourages creative design by site designers. Alternatively, prescribed planting patterns and specifications can be incorporated into the site development regulations.

6.7.2 Access Management

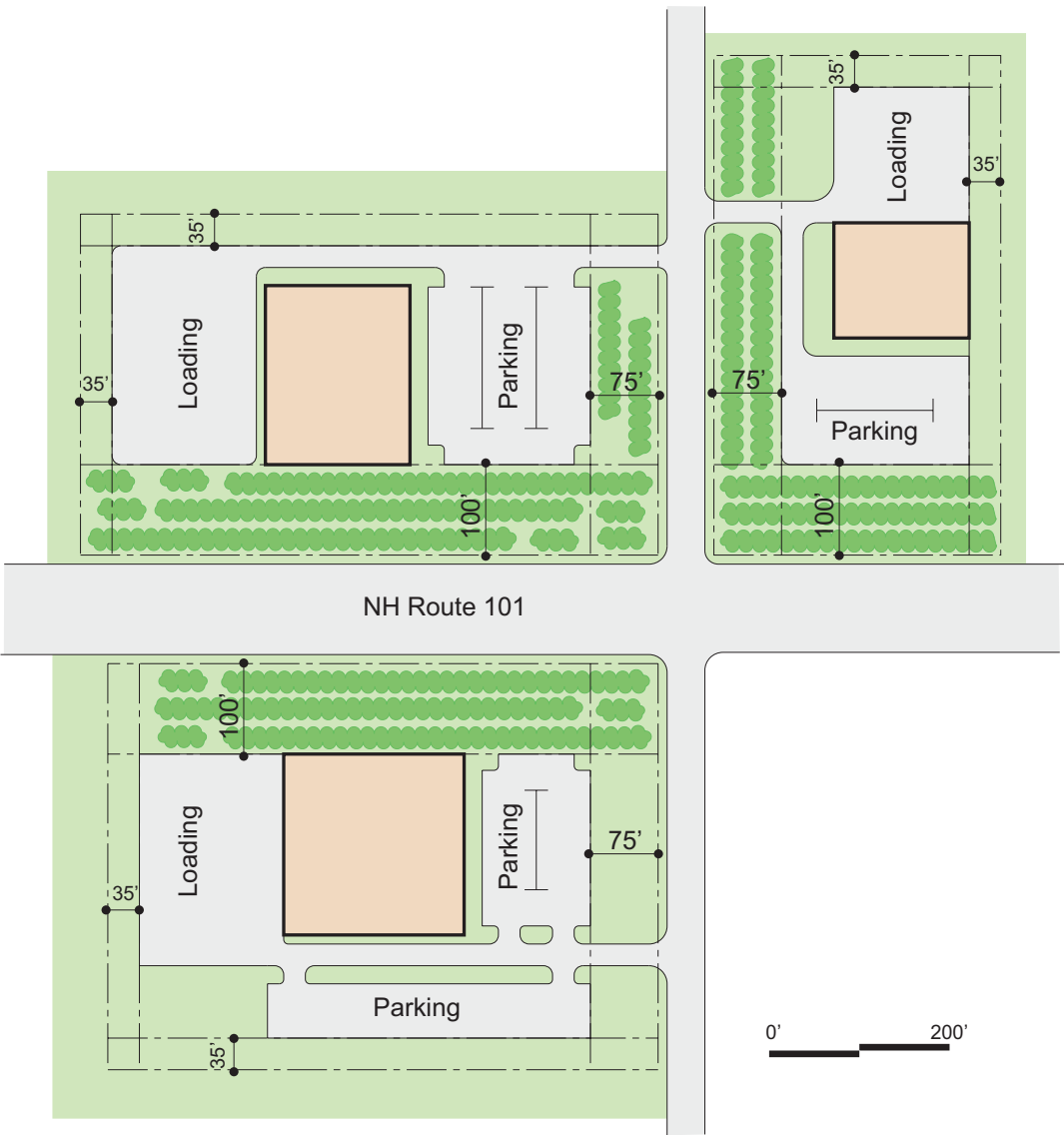
Wilton's zoning contains exemplary language limiting businesses to one curb cut on Route 101, requiring access from a side street if available instead of a curb cut on the highway, and encouraging easements to permit shared driveways and connections between adjacent commercial and industrial parcels. Side setback requirements also exempt shared parking lots from the customary 10-foot side setback to encourage this practice.

Examples of site plans using the Wilton zoning provisions are shown in the illustration.

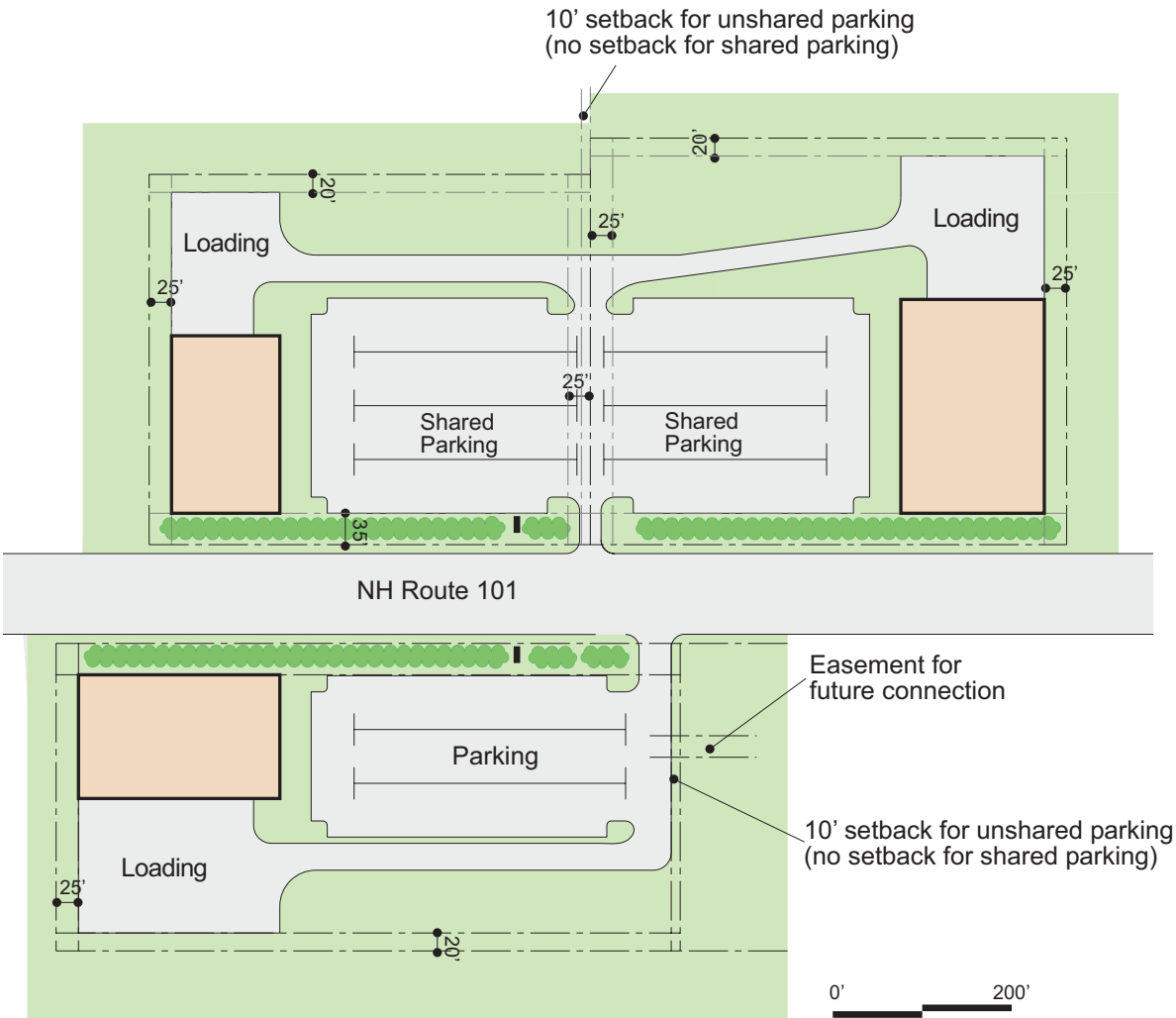
6.7.3 BROX Property

The consultant team studied the market, site design, and access issues of the BROX industrial development in Milford and the related area along Perry Road. Findings and recommendations are presented in the Appendix to this report.

Sample Site Layout: Industrial Development



Sample Site Layout: Commercial Development



7.0 Implementation

7.1 Priorities and Cost

The Implementation Program for the Route 101 Corridor consists of several actions over a time period of 10 to 15 years. Priorities were assigned on the basis of importance and urgency (for example, the need to address serious accidents on the bypass led to an interim action within three years) as well as the feasibility of obtaining project funding from federal and state transportation funds. The table in the Executive Summary compares the actions proposed for Amherst, Milford, and Wilton to the implementation program for Bedford, which is fully documented in a separate report.

It should be noted that there is some overlap between the cost of the Route 101A interchange improvements and some ramp improvements recommended by the NRPC Route 101A Corridor Plan, a plan for Route 101A from Nashua to Milford.

Although the total cost of the Corridor Plan is considerable, it should be noted that all of the projects directly benefit one of the state's two major east-west highways in southern New Hampshire (the other one being Route 9.)

7.2 Implementation Process

This section addresses the crucial process of making the Route 101 Corridor Plan a reality. The Corridor Plan comprises two documents, one for Bedford (which is in the Southern New Hampshire Planning Commission region) and this report for the three towns in the Nashua Regional Planning Commission's region. These documents have been coordinated through a four-town Steering Committee from the inception of the planning process in May 2001. It is therefore appropriate that this section address the implementation of the combined recommendations for the entire corridor.

The Route 101 Corridor Plan is a first step toward action. The second step will be detailed engineering of each project. The Corridor Plan summarizes what the improvements are expected to look like, their size, and their level of impact. Detailed analysis of wetland impacts and property requirements goes beyond the information available at this stage and will be part of preliminary engineering design, which will overlap with environmental assessment. There will be a public process for each project to review the design and suggest improvements. Locations of left turns will be determined through this process. Following the preliminary design and environmental assessment phase, final design and construction will occur as funding for each project element is secured and committed. In order to expedite the improvement of near-term projects (including the Hardy/Jenkins and Meetinghouse intersections, bottleneck improvement between Route 114 and Old Bedford Road, the interim project to provide greater separation between travel lanes on the bypass in Amherst and Milford, geometric improvements in Wilton, and center left-turn lanes in Wilton, Milford, and Bedford) it is recommended that individual assessments be done for these rela-

Route 101 Corridor Implementation Chart

Phasing of Amherst-Milford-Wilton Improvements	Cost (\$million)	Phasing of Bedford Improvements	Cost (\$million)
Immediate Action (this year)			
Safety warnings for the Milford bypass using variable and fixed message signs.			
Urgent Actions (within 3 years)			
Overlay of Milford bypass from western end to Route 101A and painted 4-foot median to increase safety margin.	\$0.4 to \$0.6 mil	Improvement of the Hardy/Jenkins intersection with a traffic signal and left turn lanes	\$2 million
		Elimination of the 101/114 bottleneck by extending the merge past Old Bedford Road.	\$0.5 million
Short-Term Actions (within 3 to 5 years)			
Geometric and sight-line improvements in Wilton	\$1 million	Nashua-Bell Hill overpass for local traffic and connector road from Nashua Road to Wallace Road.	\$4.5 million
		Center left turn lanes at Kahliko Lane, Gage Girls Road to Elk Drive, and Twin Brook Lane.	\$1 million
Medium Term Actions (within 5 to 10 years)			
Widening of Bypass to 4 lanes with median from western end through 101A interchange (includes Rte 13 and Rte 101A interchange improvements, flyover ramp, and gateway landscaping)	\$21.2 million	Improvement of Meetinghouse Road intersection (5-lane cross-section)	\$2 million
Bypass extension in western Milford (includes gateway landscaping)	\$5.2 million	Widening of Route 101 to 4 lanes with median divider from Route 114 to Meetinghouse Road	\$3 million
Local service overpass at Horace Greeley Road (installation of median can be added prior to full 4-lane section if coordinated with Joppa Hill Rd improvements in Bedford)	\$2 million	Creation of 4-lane boulevard from Meetinghouse Road to Wallace Road with landscaped median providing places for left turns.	\$3 million
Local service overpass at Walnut Hill Road, allowing traffic to reverse direction	\$2 million		
Long Term Actions (within 10 to 15 years)			
Widening of Bypass to 4 lanes with median from 101A interchange through Amherst Street interchange (includes gateway landscaping)	\$6 million	Widening of Route 101 to 4 lanes with median divider from Wallace Road to Hardy/Jenkins Road.	\$4 million
Widening of Route 101 to 4 lanes with median from 101A interchange through Walnut Hill Road, with local service road connection from overpass to Amherst St via Limbo Lane	\$7.6 million	Improvement of Joppa Hill/Stowell Road intersection with traffic signal and jug-handle turn-around connections.	\$2.5 million
Widening to 4 lanes with median from Walnut Hill Road to Bedford Town Line. (must be phased with or after Joppa hill intersection improvement in Bedford)	\$3.6 million	Widening of Route 101 to 4 lanes with median divider from Hardy/Jenkins to Amherst Town Line	\$6 million
Improvement of shoulders in Wilton and Greenville Road intersection improvement (includes gateway landscaping)	\$3.5 million	Reconstruct Route 114/101 intersection as two-level signalized intersection.	\$15-20 million

X signal

13953

tively small projects, with a consolidated assessment of the highway widening and later phase intersection improvements. The Nashua Road, Horace Greeley, and Walnut Hill Road overpasses and connector roads could receive individual environmental assessments or be included in the consolidated environmental assessment of the Corridor Plan, depending on the schedule for the overpass project.

Funding is a key issue. The recommended improvements are part of a coordinated Plan and are all eligible for federal funding at an 80% level, with the remaining 20% state/local. Because the Route 101 Corridor Plan improves safety and operations on a major state highway, it is likely that all or nearly all elements of the plan will be designed and built with federal and state funds, requiring no contribution by the towns. Maintenance responsibility will need to be discussed with New Hampshire DOT during the implementation process; it is possible that the state will accept the responsibility to maintain medians and other highway landscaping within the right-of-way.

Costs will be spread over the implementation period, which is 10 to 15 years. The Bedford Town Council voted to approve the Corridor Plan on August 14, 2002. To secure funding the Southern New Hampshire Planning Commission must amend its Long Range transportation Plan to include the Bedford projects, and the Nashua Regional Planning Commission will likewise add the improvements in Amherst, Milford, and Wilton to its Long Range Transportation Plan. Projects in the Corridor Plan must win the approval of New Hampshire DOT to be included in the next revision of the state Long Range Transportation Plan. The Route 101 Corridor Plan recommendations for Bedford through Wilton have been coordinated through the Route 101 Steering Committee, which has representatives from all four towns.

Because of the urgency of the current situation, the Hardy/Jenkins intersection has been recommended for an earmark in the FY 2003 federal transportation budget.

Adopting design guidelines is a town action that can be undertaken over the next year or two, following technical drafting, study by the Bedford and Milford Planning Boards, and public hearings.

7.3 Project Funding Process

Roadway projects chosen for state funding are normally selected from the Statewide Transportation Improvement Program (STIP). In the State of New Hampshire, the Ten-Year Transportation Improvement Program is an intermodal program of transportation projects, as developed and updated every two years under RSA 228:99. The Ten-Year Program identifies projects, a schedule of when the projects would occur, and suggested funding categories (as defined by federal legislation in the case of federal funds) that can be used to implement the design and construction of projects.

The Ten-Year Program is developed through the cooperative efforts of municipalities, Regional Planning Agencies and Metropolitan Planning Organizations, the New Hampshire Department of Transportation, the Governor's Advisory Commission on

Intermodal Transportation, the Governor, and the New Hampshire Legislature. Throughout the Ten-Year Program development there are numerous opportunities for public input and involvement.

The process for projects coming out of the Route 101 study is summarized as follows:

- New roadway projects are introduced in the fall of even-numbered years. In this case the town of Bedford will submit the Route 101 project to the Southern New Hampshire Planning Commission by October of 2002, and the improvements in Amherst, Milford, and Wilton will be addressed by the Nashua Regional Planning Commission. It is likely that the individual short-term improvements will be submitted as individual projects, and the later project phases submitted as multi-part projects for scheduling, funding, and implementation purposes.
- The projects will be ranked along with other projects submitted and regional public hearings will be held. The Transportation Advisory Committee (TAC) for each region ranks the projects submitted by the regional planning agencies.
- Projects are added to a Draft Regional 10-Year Plans early in the spring of the following year (2003) and are then submitted to the NHDOT for consideration for the various funding categories available.
- The NHDOT will then prepare a statewide 10-year program, which is submitted, to the Governor's Advisory Commission on Intermodal Transportation (GACIT). Following a series of public hearings that will be held throughout the state, the GACIT will finalize a Draft 10-Year Plan.
- The Governor reviews the 10-Year Plan and submits it to the Legislature for adoption and a Statewide Transportation Improvement Program is submitted to the Federal Highway Administration (FHWA) and Federal Transit Administration (FTA) for approval.
- The project development process begins with the preparation of preliminary engineering and environmental documentation to understand the socio-economic and environmental impacts as well all of the project improvement measures and costs.

The Route 101 improvements will likely require the development of one or more Environmental Assessments (EA) or possibly Environmental Impact Statements (EIS) to evaluate all of the Corridor Plan's impacts to cultural and environmental resources. Numerous public meetings would be held and a formal public hearing would also be held to obtain testimony and determine the necessity of the proposed improvements.

Acknowledgements

The Route 101 Corridor Plan for Amherst, Milford, and Wilton was prepared for the Nashua Regional Planning Commission with funds provided by New Hampshire Department of Transportation. The NRPC staff provided data collection, analysis, and mapping for the project and managed the consultant team.

Steering Committee

The Corridor Plan was coordinated by a Steering Committee with representation from Amherst, Bedford, Milford, and Wilton and the NRPC staff:

- Michael Davidson, Wilton Planning Board
- Bill Greiner, Bedford Town Council
- Keith Hickey, Bedford Town manager
- Bill Parker, Milford Planning Director
- Marilyn Peterman, Amherst Board of Selectmen
- Michael Scanlon, Bedford Town Council
- Andrew Singelakis, Executive Director, NRPC
- Stephen Williams, Assistant Director and MPO Coordinator, NRPC
- Matt Waitkins, Transportation Planner, NRPC
- Karen White, Bedford Planning Director

Consultants

Jim Purdy AICP, Wallace Floyd Design Group, Project Manager

Marty Kennedy PE, Vanasse Hangen Brustlin, Inc., Assistant Project Manager

Jimmy E. Hicks, RKG Associates, Inc., Consultant

Appendix A

Public Meeting Notes

Amherst-Milford-Wilton Public Meeting Notes

September 4, 2002

6:30 – 8:30 PM

A small group of residents attended the public meeting, which was held at the Milford Town Hall. Martin Kennedy, Assistant Project Manager, from Vanasse Hangen Brustlin's Bedford office gave a presentation on the final recommendations for improvement of Route 101. Following discussion, Jim Purdy, from Wallace Floyd Design Group gave a presentation on land use and development and landscaping recommendations. It was noted that these recommendations had been well-received by officials in all three towns, and there was general support for the recommendations from those present. Specific comments were as follows:

Traffic:

- There was concern about the potential inconvenience of restricting left turns from side streets such as Saddle Hill Road in Amherst. Residents would have to travel to Joppa Hill Road in Bedford (approximately 1.5 miles) to reverse direction in order to enter their street from eastbound Route 101. It was suggested by the consultants that this tradeoff is necessary to manage access for reasons of both traffic flow and safety. The same issue was discussed in Bedford, where most of the Bedford Advisory Committee agreed that the turn restrictions are necessary and that many people already forego left turns which they believe are unsafe. There is a direct safety benefit for those people who are inconvenienced.
- It was suggested that the total time required to go to a safe turn-around point such as the proposed Horace Greeley overpass would only be a couple of minutes and is not significant.
- Concern was expressed about traffic being diverted along Old Manchester Road to the Horace Greeley overpass/turn-around by drivers who now make left turns onto Walnut Hill Road. (The number of such diverted trips is expected to be small, given the potential to enter Walnut Hill Road at the proposed local overpass which would connect it to westbound Route 101.
- Is a two-lane cross-section sufficient on the proposed extension of the bypass in western Milford? The situation is borderline, and the consultants will look at output from the NRPC traffic model and reconsider this cross-section if necessary.
- There was discussion about the time frame for improving the bypass, both in the short-term (4-foot painted median with plastic delineator posts) and long term (4-lane cross-section with 26-foot planted median. The three NRPC

towns and Bedford are cooperating to advance the Route 101 Corridor study projects in the regional Long Range Transportation Plans and the state Transportation Improvement Program. The interim safety improvements are recommended for implementation within 3 years if funds can be secured, and long-range improvements in 5 to 10 years.

- Traffic backups on the eastbound exit ramp to Route 101A was discussed. The Corridor Plan recommends a double right-turn, which should relieve the ramp queue.

Amherst Visioning Workshop Notes

January 8, 2002

6:30 – 8:30 PM

Approximately 12 Amherst residents, officials, and business people attended the meeting, which was held at the Town Hall. NRPC Project Manager Matt Waitkins introduced the consultants working on the Route 101 Corridor Study. Jim Purdy, the Project Manager from Wallace Floyd Design Group and Martin Kennedy, Assistant Project Manager from Vanasse Hangen Brustlin's Bedford office gave a brief presentation of the traffic analysis of Route 101 in Amherst as well as land use, zoning, and the visual analysis. A progress report on work in the Bedford portion of the corridor was also presented. The balance of the meeting was devoted to a discussion of Amherst residents' vision for the 101 Corridor.

Summary:

- o There was substantial interest in solving safety problems along Route 101 as soon as possible, including providing for safer left turns off of and onto Route 101, improved merges on the bypass section, providing safer opportunities to pass slow moving traffic, and measures to prevent cross-over accidents.
- o There was general agreement that the section of Route 101 east of the Amherst Street/Spring Road interchange should retain its present character, and become neither more urbanized through the installation of traffic signals, nor more like a limited access highway with median barriers, etc.

Character of the Road

- o There are two very distinct sections of Route 101: the bypass section and the section between the bypass and the Amherst/Bedford town line. The bypass section is basically good as it is, although some improvements should be made. The character of the non-bypass section is very important to people who live in the town and should not become either more highway-like nor more urbanized.

Bypass Section

- o There is a need for some protection against cars crossing over the center line on the bypass section. A rumble strip of textured pavement is thought to be sufficient and is preferable to a concrete median barrier or guard rail.
- o Many of the accident situations on the bypass result from frustrated drivers passing slower traffic in a dangerous manner. Addition of passing lanes in several locations in Amherst and Milford (particularly on upgrades which cause trucks to slow down) would do much to solve this problem. A four-

lane section throughout the bypass does not seem necessary if there are opportunities to pass.

- o There are hazardous merge areas, such as at the Route 101A interchange in Milford, where cars entering heavy traffic during peak periods increase the risk of accidents. The merge west of the Meeting Place was also mentioned as a potentially dangerous situation. The consultants will look at possible geometric improvements.
- o It would be desirable to provide for the two movements that are not served by the half-interchange at Ponemah/Boston Post Road. This situation increases traffic on local roads. There may be insurmountable problems in adding these movements because of the presence of wetlands, but the possibility of developing a smaller footprint for a full interchange should be investigated.

Route 101 East of the Bypass

- o Left turn lanes are needed in a number of places to make movement in and out of streets and businesses safer. An example is the turn lane at the Meeting Place.
- o The left turns could possibly be accommodated in a bi-directional center turn lane.
- o The right turn lane at Horace Greeley Road is helpful, but the edge of pavement is too close to utility poles; these should be moved back. There is a similar problem turning into the Black Forest.
- o Walnut Hill Road is a location where left turns are difficult and dangerous and should be improved.
- o Old Manchester Road should also be considered for a turn lane.
- o The turns into and out of the Town transfer station seem to work reasonably well because of traffic patterns.
- o The consultants will look at capacity to carry future traffic volumes, which are projected to be 40% higher twenty years from now.
- o There is a parking problem at Bragdon farm, but this seems to be more of an off-the-road problem. However, the parking on the shoulder which results poses a hazard.
- o At the Meeting Place, an improved intersection should be considered, with a possible entrance to a parcel zoned for office use immediately opposite.
- o Cut-through routes should not be improved in a manner that encourages traffic from Route 101 to divert.
- o Providing new connector roads between some side streets that enter Route 101 might be a way to improve traffic flow and safety on Route 101 without widening it at these intersections.

Aesthetics

- o There would be opposition to any widening or median divider along this stretch of Route 101.
- o The first interchange on the Bypass is an important location. It should be landscaped to create a gateway to the village center.
- o Trees screening the transfer station may be in jeopardy because of conflict with overhead electric lines, which requires tree-trimming by the Public Service Company. One possible solution id to plant a second row of trees further back from the utility poles.

Bicycles

- o It is important to preserve the paved shoulder, which is the route of choice for many bicyclists.

Public Meeting Notes

June 13, 2001 Amherst Town Hall

7:30 – 9:00 PM

Approximately 30 Amherst residents and business people as well as representatives of Nashua Regional Planning Commission (NRPC) attended the meeting. Matt Waitkins of NRPC greeted those attending and introduced the consultants who were hired to do the study. Jim Purdy, the project manager from Wallace Floyd Design Group and Martin Kennedy, Assistant Project Manager from Vanasse Hangen Brustlin's Bedford office gave a brief overview presentation on the study. The balance of the meeting was devoted to comments from those attending on issues, concerns, and possible solutions to be considered. Comments recorded from citizens and businesses are summarized below. A range of opinions was expressed. Facts raised in comments will be checked as the study progresses.

Conducting the Study

- o Q: Why isn't the Amherst part of the Corridor Study using federal funds (like Bedford's)? A: Bedford pursued and won a federal TCSP grant from Federal Highway Administration. NRPC worked to extend the study through Amherst, Milford, and Wilton and secured New Hampshire DOT funding for this purpose.
- o New Hampshire DOT should attend the Route 101 Corridor Study meetings.
- o We should invite local legislators to a Corridor study meeting.

Traffic and Congestion

- o Traffic is getting worse each year, and the existing 2-lane highway can't accommodate it.
- o There are access problems at the Meeting Place entrance and at the entrance to the town landfill.
- o In the morning traffic backs up from Route 114 all the way to Wallace Road.

Bypass and Widening

- o Q: NHDOT planned an east-west highway across southern New Hampshire during the 60s, but there has been no action west of I-93. Where will a solution to this need come from? A: New highway alignments can be considered during the Route 101 Corridor Study; it should be realized, however, that a project of that type and scale would have many problems to overcome, including property acquisition, environmental regulations, and

funding.

- o Without a new bypass highway, the Corridor study is really a stop-gap or band-aid approach to a corridor-wide problem.
- o The Amherst/Milford Bypass was originally planned to continue over Abbott Hill in Wilton and is still worth doing.
- o There is already enough right-of-way along the Amherst/Milford bypass to widen to 4 lanes. (Note: The study will look at existing right-of-way.)
- o It remains to be seen whether there is enough right-of-way along the existing bypass to accommodate 4 lanes at the interchanges.
- o A 4-lane divided highway is needed across the full width of southern New Hampshire
- o There was a former NHDOT proposal to connect from Keene to Concord via the Route 9 corridor. This would alleviate some through traffic from Route 101.
- o The town is of two minds regarding the benefits and impacts of widening Route 101 to 4 lanes.
- o We are tending to think tactically about small improvements when we should be thinking strategically about a complete solution, which requires a new roadway to be built. We need to think outside the box.
- o A bypass proposal would raise many wetland issues, many land conservation issues, and there would be a big fight over it.
- o The problem with a new bypass is that there has been a great deal of development since the 1960s and it will be hard to find a corridor for a new east-west highway.
- o The existing bypass should be widened to four lanes.
- o The east-west highway should be moved out of Amherst altogether.
- o What would happen if Route 101 had a two-lane section in Amherst between potential four-lane sections in Bedford and Milford?
- o There are only two alternatives in the long run: divided highway or a road like Route 101A in Nashua.

Safety

- o How we use the existing travel lanes on Route 101 is more important than trying to get new lanes. Dangerous driving (distracted by cell phone, passing on the shoulder, etc.) is the more important problem to solve.
- o Safety requires immediate action, even if it might be considered “stop-gap”.
- o Small town amenities are nice, but safety is paramount, and the highway won’t be safe unless it is limited access divided.
- o Safety is also an issue on the bypass, particularly related to crashes while passing and generally bad driving practices by some.
- o Rumble strips should be considered as a safety improvement – at center line

and shoulder.

- o Chain reaction rear-end crashes occur due to left turns, e.g., at the Bedford/Amherst town line.
- o In winter, skidding on ice and snow is a hazard where the highway curves between Walnut Hill Road and Schoolhouse Road.
- o Lane markings are often hard to see, especially in the winter.
- o Left-turn lanes shouldn't be designed so as to reduce the breakdown lane.
- o Signals should be timed to encourage moderate speeds and avoid stops.
- o There are many near-misses when traffic stops for school buses.

Roadway Improvements

- o Some traffic signal improvements may create problems of their own, for example the signal at Wallace Road in Bedford is at the bottom of a hill; trucks stopped at the signal need to accelerate and no lane is provided for this purpose, so traffic is delayed.
- o The ramp geometry at the Route 101/101A interchange is too tight, causing problems for trucks.
- o The Milford end of the Route 101 bypass should be connected directly to Route 13 in Mont Vernon by a new road.
- o It is difficult to get onto Route 101 from Walnut Hill Road due to heavy traffic and high speeds; it is even harder and more dangerous to make a left turn into Walnut Hill Road. Selectwoman Peterman stated that a left turn lane at this intersection is a town priority with local funding committed; it will be implemented when the state funding share can be secured. There are several left turn lanes in planning.
- o Better street lighting is needed on the highway, especially at intersections.
- o The Route 101/114 intersection in Bedford is bad, but the Route 3 interchange near Macy's is worse. (Note: the interchange will be reconstructed, probably in the next two years.)
- o The intersection at the Amherst end of the bypass and Route 101 from there to the Meeting Place has problems and needs better signage and lane striping.
- o Why does Bedford have traffic signals but not Amherst? It was noted by others that this is partly a matter of different philosophies and that traffic volumes differ as well. (Signals will be considered during the study.)
- o At the Route 101/101A interchange there is a need for a free turning lane; long traffic queues form here at present. This is also being looked at in the Route 101A study (a separate study from the Route 101 study.)
- o Traffic signals can cause traffic backups; sometimes it's better not to have a signal.
- o Q: Do traffic improvements need to result in higher speeds? It was noted that coordinating traffic signal timing can limit speeds; timed signals be-

tween Peterborough and Nashua are effective until the morning peak hour, when congestion builds (which also limits speeds.)

- o The Route 114/101 intersection also needs improvement along the Route 114 leg.
- o The 5-lane section of Route 101A near Wal-Mart is dangerous and shouldn't be emulated.

Land Use and Development

- o Amherst's commercial zoning along Route 101 is limited; no open land is commercial zoned at present.
- o A commercial kennel wasn't recently granted a special exception as a permitted use; it is up for site plan review on July 11.
- o There has been a recent boom in Amherst's school population.
- o Small towns on the outskirts of the Route 101 corridor like Mont Vernon and Lyndeborough have a great deal of land that can be developed and increase traffic on Route 101.
- o We should stop encouraging people to move to New Hampshire, which makes the traffic problem worse.
- o Growth is a function of town planning, not the number of lanes on Route 101.
- o We need to get ahead of development with our planning and not just react to it.
- o The study should look at growth control examples where divided highways were built, e.g., along I-495 in southeastern Massachusetts.

Access Management

- o There are problems with parking for the sledding hill at Bragdon Farm. Curb cut approval is needed for a parking lot there.

Pedestrians and Bicycles

- o There are lots of bicycles using Route 101.
- o Passing on the right is a hazard, especially for bicycles (and pedestrians).

Neighborhood Impacts

- o We need to address the problem of neighborhoods cut off from the rest of Amherst by the highway.
- o Bad intersections encourage people to divert to local streets.
- o The half-interchange at Route 122 (Ponemah Road) causes traffic to divert to town roads. It was noted that wetland impacts is a reason this interchange was not designed to serve all directions.
- o Thornton Ferry Road is posted at 30 mph but gets many cars traveling at 50

mph, endangering the many people who walk along the road. There should never be a direct exit from Route 101 here.

Funding and Implementation

- o Q: If we conclude that a new east-west highway is needed, what is the protocol to bring that message to NHDOT? A: the Route 101 Corridor Study provides a good communication channel to NHDOT.
- o Approximately ten years ago, NHDOT would not install a traffic signal requested in Wilton. (However, philosophy may have changed since then.)
- o How long will it take to implement the plan? A: projects could range from 1-2 years to over 10 years if there are very large scale recommendations.

Milford Visioning Workshop Notes

January 29, 2002

6:30 – 8:30 PM

Approximately 25 Milford residents, officials, and business people attended the meeting, which was held at the Town Hall. NRPC Project Manager Matt Waitkins introduced the consultants working on the Route 101 Corridor Study. Jim Purdy, the Project Manager from Wallace Floyd Design Group and Martin Kennedy, Assistant Project Manager from Vanasse Hangen Brustlin's Bedford office gave a brief presentation of the traffic analysis of Route 101 in Amherst, as well as land use, zoning, and the visual analysis. A progress report on work in the Bedford portion of the corridor was also presented. The balance of the meeting was devoted to a discussion of Milford residents' vision for the 101 Corridor.

Summary:

- o The discussion focused on safety along Route 101, especially in the bypass section and its interchanges, and the Old Wilton Road intersection. The 1010 Corridor Study should consider the impacts of the highway on collector streets and cut-through routes throughout Milford, where traffic affects residential neighborhoods. Improvements in the west end commercial district and development of the Brox property are also part of the vision for what the study can accomplish.

Character of the Road

- o There are two very distinct sections of Route 101 in Milford: the elevated bypass section and the section between the bypass and the Milford/Wilton town line. This section includes a congested traffic signal at Old Wilton Road, and development ranging from large industrial and retail sites such as Hitchiner manufacturing and Market Basket, to a series of small commercial and retail sites west of the 101/101A traffic signal and at the road into Wilton.
- o Current weekday traffic volumes on the Amherst/Milford bypass are in the range of 20,000 vehicles per day and roughly 1600 vehicles in the peak hours. Volumes are projected to grow approximately 40 percent over the 20-year time horizon of the study. Marty Kennedy discussed the ability of the road to carry these volumes, which depends on the peak hour volumes rather than the daily volumes. On the bypass section, it will be a close call but within the range of possibility; west of the bypass, peak hours are likely to experience significant congestion without action to address the problem.

Bypass Section

- o Safety is the key concern, particularly in the stretch of road which curves and descends to the traffic signal at Old Wilton Road. Key issues identified by those attending the meeting were backups from the traffic signal which are hidden by the curve; crashes caused by drifting over the center line; impatient drivers passing in a hazardous manner; solar glare; insufficient shoulder width in some areas. Part of the problem may be the tendency for motorists to put on a burst of speed when they get onto the bypass. NHDOT is reported to be looking at safety improvements such as center line rumble strips or medians.
- o There is a significant connection between problems on Route 101 and on the roads which intersect it. The signalized intersection at the 101A interchange creates backups which can be hazardous. (The new shopping center near Lorden's Plaza is paying for some improvements at the 101A traffic signals.) Ponemah Hill Road is used as a cut-through route to avoid this congestion. The linkage between 101 and 101A is seen as an important issue and the 101 study must be coordinated with NRPC's 101A Corridor Study, which is also being done by VHB. A successful outcome of the 101 Corridor Plan would remove the highway's impact on local streets.
- o Milford has just completed a traffic study (done by Hoyle Tanner) which includes options such as improvements to an east-west corridor connecting to Osgood Road and Route 13. The study also considered a new interchange serving the Brox development area as well as other corridor improvements within the town. The 101 Corridor Study will coordinate and use the input from this study.
- o Milford could benefit from landscaping at the gateways to the town (much like the suggestion in Amherst to provide landscaping at the entrance to the town center.) Locations include Route 101A as one enters from Merrimac, the Route 13 interchange, and the intersection near Granite bank, where 101A continues east toward the Oval.
- o Cut throughs are a major concern. Many collector roads are also residential streets, making them sensitive to the added traffic. Conditions on Route 101 lead to changes in commuting patterns, with many cars preferring to use local streets instead of the highway.
- o Possible options might include adding passing lanes at several locations along the bypass, or widening to 4 lanes. A median divider should also be considered. There was mixed opinion about the desirability of a median divider for aesthetic reasons. Wider rumble strips might be an alternative to a median barrier but not as effective in preventing cross-over accidents. The divider in Franconia Notch was suggested as a model of more aesthetic design. A vegetated median would look best, but also requires considerable added width to the highway.
- o Ramps are a concern; acceleration and deceleration lanes might improve safety, particularly at Route 13. There is sometimes ice on the ramps in the rock cuts.
- o Care should be taken not to push problems to the west end of Milford.

-
- o Control of speeds is an important factor.
 - o Both variable electronic and fixed conventional signage should be considered to alert drivers to road conditions, to check their speed, and to remind drivers of possible hazards and encourage safe driving.

Route 101 West of the Bypass

- o The west end of Milford includes the commercial strip and Route 101 sandwiched between the railroad track and the Souhegan River. It also includes the traffic signal at Wilton Road where the Bank of New Hampshire is located and a new Irving gas station and convenience store is proposed. Curb cuts are an issue along this stretch of roadway. The study should consider whether it would be possible to provide a mini-bypass for this area.
- o The Old Wilton Road intersection is a problem both for safety and traffic flow.

Other Issues

- o The Brox property contains over 80 acres planned for light industrial or commercial development. Comments about this area, which is part of the Corridor Study included: should be attractive when viewed from Route 101; needs to have improved access; should seek uses that provide local employment and reduce commuting; should be developed as soon as possible to create a revenue stream for the town. A new interchange serving the Brox property would also allow school buses to avoid the Old Wilton Road intersection.
- o The study should consider and include town plans for multi-use trails parallel and crossing the highway.

Public Meeting Notes

June 5, 2001 Milford Town Hall

7:30 – 9:00 PM

Approximately 30 Milford residents and business people as well as representatives of Nashua Regional Planning Commission attended the meeting. Matt Waitkins of NRPC greeted those attending and introduced the consultants who were hired to do the study. Jim Purdy, the project manager from Wallace Floyd Design Group and Martin Kennedy, Assistant Project Manager from Vanasse Hangen Brustlin's Bedford office gave a brief overview presentation on the study. The balance of the meeting was devoted to comments from those attending on issues, concerns, and possible solutions to be considered. Comments recorded from citizens and businesses are summarized below. Although there was considerable agreement on some matters (such as safety), a range of opinions was expressed. Facts raised in comments will be checked as the study progresses.

Conducting the Study

- o Q: How does one get appointed to the Steering Committee? A: NRPC will be working with the towns to appoint a committee over the next few weeks.
- o The role of the Steering Committee should be defined. (It will advise the study and review reports and products.)
- o Q: Can we get copies of the reports produced in the study? A: Yes, after review by NRPC and the Steering Committee, reports will be linked to a project web site and can be downloaded.

Traffic and Congestion

- o Traffic is steadily increasing on 101. This makes safety a big concern.
- o Truck traffic on Route 101 is annoying, especially where the roadway climbs hills and trucks slow down, for example from Route 13 eastbound to Route 101A.
- o The railroad crossing near the Route 101/101A intersection causes traffic backups in the morning. The railroad is a valuable part of the infrastructure, but some better crossing design should be devised.
- o The study should look at the existing traffic counts at several points along Route 101: traffic volumes vary substantially in an up-and-down pattern.
- o The study should identify the existing traffic bottlenecks.
- o We should look for ways to reduce or limit the increase in traffic volumes on Route 101.

Safety

-
- o Short-term safety improvements that are needed include rumble strips to mark the center median to alert drivers drifting across the center of the roadway; wider breakdown lanes; and measures to reduce hazards from solar glare.
 - o There should be a central median barrier to prevent head-on collisions on Route 101 all the way from Baboosic Lake Road to Meadowbrook Drive.
 - o The study should look at accident hot-spots all along the corridor. Hazardous areas include the bypass eastbound between Route 13 and 101A.

Bypass and Widening

- o The study needs to be forward-looking and consider a bypass. The current Amherst-Milford bypass was planned in the 1960s. Without it, all that traffic would be coming through the Milford Oval.
- o Trucks prefer limited access highways, like Route 101 between Manchester and the seacoast. Can a limited access highway bypass be provided through more of the corridor?
- o Q: Is any more consideration being given to a Route 101 bypass west of Wilton? A: Not at present.
- o We should look at towns like Epping, Raymond, and Exeter to consider the benefits and impacts of a limited access bypass.
- o The study should consider widening the elevated portion of the bypass.

Roadway Improvements

- o Q: Does the state own right-of-way along the Milford/Amherst Route 101 bypass that might permit widening? A: The study has just begun and this information is not known at this point. The study will assemble this type of data over the next two months.
- o Busy intersections and business entrances should be improved by providing turning lanes. An example is the Black Forest Restaurant in Amherst. There should also be center lanes for left turns along stretches of Route 101 with commercial strip development.
- o Some drivers divert to Amherst Street for trips to and from the east, because the interchange of Route 101 with Route 122 in Amherst serves traffic only to and from the west. We should encourage through traffic to use the bypass by adding the missing ramps.

Land Use and Development

- o The study should consider access to the developed area near Hitchiner Manufacturing, which includes developable area and a new school site south of Route 101. Direct access through an new interchange on Route 101 would be preferable to the current local roadway access to this area.
- o The market Basket supermarket draws large volumes of traffic; the impacts of future development should be considered.

-
- o There are approximately 125 acres of developable land on/around the Brocks property near the west end of the bypass. Direct access should be provided or at least better entrances from Old Wilton Road.

Access Management

- o There needs to be truck parking at roadside businesses such as Dunkin Donuts.
- o The owner of SilvaMart has invested in improvements including granite curbing to improve access and egress.

Pedestrians and Bicycles

- o Bike paths should be provided parallel to the highway.

Other Modes

- o Bus service should be considered in the Corridor. (NRPC is getting CityBus to serve the Milford Oval.)
- o Van pools should be considered as a way to reduce commuting traffic.

Aesthetics

- o The Route 101 Corridor should not look like 101A in Nashua.

Funding and Implementation

- o How do recommendations from the study get into the DOT 10-year plan? (Recommendations supported by the towns in the corridor have the best chance of being added to the plan, which is revised every two years.
- o Q: Is NHDOT responsive to local plans? A: Yes. NHDOT gives significant weight to the wishes of local governments in planning transportation improvements.
- o Projects have a better chance of being implemented if alternative sources of funds are identified, e.g., grants from Federal Highway Administration, such as the TCSP grants received by Bedford and Concord.
- o The study should provide information on the cost of potential improvements, such as a new interchange.
- o Q: Do all four towns have to agree on recommendations? What happens if they don't? A: Decisions about improvements within a single town are made by that town. All four towns will need to reach agreement on recommendations that affect the Corridor as a whole.

Other Issues

- o The rights of travelers to have convenient highway access need to be balanced with the rights of property owners and town residents who may be adversely affected by highway improvements.

Wilton Visioning Workshop Notes

January 15, 2002

6:30 – 8:30 PM

NRPC Project Manager Matt Waitkins introduced the consultants working on the Route 101 Corridor Study to a group of Wilton residents at the workshop. Jim Purdy, the Project Manager from Wallace Floyd Design Group, and Julie Tyson, Traffic Engineer from Vanasse Hangen Brustlin's Bedford office gave a brief presentation of the traffic analysis of Route 101 in Wilton, and Jim Purdy reviewed land use, zoning, and the visual analysis. A progress report on work in the Bedford portion of the corridor was also presented by Martin Kennedy of VHB, the Assistant Project Manager. The balance of the meeting was devoted to a discussion of Wilton residents' vision for the 101 Corridor.

Summary:

- o Residents want a safer Route 101, with better provision for turns in and out of side streets like Abbott Hill Acres and commercial development.
- o There was consensus for keeping Route 101 much as it is today (with safety improvements) and addressing access control issues for current and future commercial development.

Safety

- o Accidents occur near commercial sites such as 101 Convenience, Bursey's, and Monadnock Water Co. Sight lines vary from reasonably good at 101 convenience to poor at Bursey's. A center turning lane would be helpful in accommodating left turns into these sites.
- o Cars are often parked on the shoulder near House by the Side of the Road on busy Saturdays. The study should consider whether adding a parallel roadway to serve commercial properties would be helpful.
- o The skew intersection where Isaac Frye Highway joins Route 101 (just beyond the end of the study area) is another problem area.
- o A green arrow traffic signal for the right turn lane from Route 101 to Wilton Road near the bank of New Hampshire would improve traffic flow when no conflicting traffic is present and would help protect cars stopped at the traffic signal before the turn, improving safety.
- o Intersections should be better lighted to improve visibility for safety.
- o Abbott Hill Acres remains one of the most difficult intersections in town due to the poor sight lines where it joins Route 101 and the steep grade that starts at the intersection. Turn restrictions at this location would probably help, but leaving the subdivision via Abbott Hill Road may not be an option

in winter for people who live on the steep hill. The study should determine if an actuated traffic signal would be warranted.

- o Abbott Hill Road was improved by NHDOT this past summer and is improved in terms of visibility and turning lanes. There is some feeling however, that these improvements reduced clearance at the side of the road making it harder for eastbound traffic (especially trucks) to avoid stopped traffic in an emergency situation. In addition, the wider pavement may encourage higher speeds. There was also feeling that removal of the blinking yellow caution signal was a mistake and that the caution signal should be replaced.
- o While turning lanes are helpful, it is difficult in snowy or wet conditions to see the lane markers. The use of overhead markers or embedded reflectors should be considered.
- o The recycling center is busy on weekends, Tuesdays and Thursdays. Access improvements would be helpful.
- o In general, no more traffic signals are desired (except possibly an actuated signal at Abbott Hill Acres). The existing character of the road should be preserved.
- o The possibility of restricting some left turns onto Route 101 was discussed, and while there was no clear preference for this type of measure to improve safety, the sense of the meeting was that this type of action should not be dismissed without more investigation. Turn restrictions would need to be coupled with a reasonable way of reversing direction for people headed in the restricted direction.

Development

- o There was a general feeling that too many curb cuts on the highway is a problem. Development regulations that improve access control and encourage linking of parking lots should be explored.
- o There is considerable developable land along Route 101 including large residential parcels and a large commercial zone between Abbott Hill and where Route 31 diverges to the south. Future development could add many more subdivision entrances and commercial driveways, and the study should consider how to manage this.
- o Vegetated buffers would be a good idea along new commercial development, but questions need to be answered about sight lines, the size of the buffer, and its maintenance. Good entrance lighting should also be required in the regulations for commercial development.

Public Meeting Notes

May 29, 2001 Wilton Town Hall

7:30 – 9:30 PM

Approximately 36 Wilton residents and business people as well as representatives of Nashua Regional Planning Commission attended the meeting. Jim Purdy, the project manager from Wallace Floyd Design Group and Martin Kennedy, Assistant Project Manager from Vanasse Hangen Brustlin's Bedford office gave a brief overview presentation on the study. The balance of the meeting was devoted to comments from those attending on issues, concerns, and possible solutions to be considered. Comments recorded from citizens and businesses are summarized below. Although there was considerable agreement on some matters (such as safety), a range of opinions was expressed. Facts raised in comments will be checked as the study progresses.

Conducting the Study

- o The study should project and analyze future traffic volumes.
- o How close is Rte 101 to saturation? The study should answer this question. It should also look at traffic increases if all buildable land along the highway were to be developed (build-out analysis).
- o The study should look at accidents corridor-wide and identify hot spots.
- o The study should work to relieve uncertainty for homeowners along Rte 101 who fear that their property might be taken if the road is widened.
- o Announcements for future meetings can be mailed with telephone bills and published in the Telegraph.
- o is a secondary priority.

Priorities

- o Safety and through-put on Rte 101 are the key issues.
- o Safety is the most important priority. It is past time to deal with it; travel time.

Traffic and Congestion

- o Rte 101 is the only east-west highway in this part of New Hampshire, so traffic will only get heavier in the future.
- o Congestion at the I-293/Rte 101/Rte 3 interchange affects people in the corridor. The merge with Rte 101 is hazardous; there should be signs to "keep left except to exit". (Improvements to this interchange are planned over the next two years.)

-
- o Most of the traffic on Rte 101 in Wilton is not generated by Wilton.
 - o There is sometimes congestion on Rte 101 in Milford requiring 20 minutes to travel from the Bank of New Hampshire to the State Police barracks.

Safety

- o A short-term safety measure would be to place caution signs along the highway before dangerous intersections and ramp back-ups.
- o The intersection at Abbott Hill Acres (located west of Abbott Hill Road) is dangerous due to poor sight lines; shrubs growing on the corner lot worsen the problem.
- o Site distances at Abbott Hill Road and Abbott Hill Acres are compounded in the winter when plowed snow reduces sight lines further. There should be more thorough removal of snow from these intersections.
- o In winter, cars may need to back down Abbott Hill Road to get a running start up the hill.
- o There is also solar glare during some times of the year for westbound traffic on Rte 101 at the Abbott Hill Acres intersection.
- o Trucks traveling on Rte 101 are a concern- tire marks on the pavement show that there is a lot of braking at some locations.
- o Speeds on Rte 101 in Wilton are too high. There should be lower speed limits or better enforcement of the existing speed limits.
- o We should emulate the speed reduction on Route 13 as one enters Brookline from Milford.
- o Lower speeds might be good for business, giving passing cars more time to decide to stop.
- o Cell phone use contributes to accidents and should not be allowed while driving.

Pedestrians and Bicycles

- o Pedestrian and bicycle safety is a crucial concern, especially for the many children who live in the project area.

Bypass and Widening

- o A bypass would be useful for getting trucks off this stretch of the road.
- o The study should consider more travel lanes or a bypass such as the one that was planned in 1962 of which only the Amherst-Milford section was constructed. (This included a new road over Drum Hill and a bypass to the north of Wilton Center.) This is needed to accommodate the growth in traffic as southern New Hampshire grows.
- o Widening the roadway would attract more traffic and make matters worse.
- o It would be a shame to widen Rte 101. There are many historic houses and buildings in Wilton and other towns to the west.

-
- o The Milford-Amherst section of Rte 101 should have climbing lanes for trucks, which cause backups.
 - o If widening is contemplated, it should be done only for specific problem areas and intersections. The cross section should vary from place to place, depending on conditions.

Roadway Improvements

- o There should be actuated (on-demand) traffic signals at key intersections such as Abbott Hill Road and Abbott Hill Acres.
- o At a number of intersections, including Abbott Hill Road and where Rte 31 South diverges from Rte 101, there should be street lighting to make the intersections safer at night.
- o Eastview is a residential development with approximately 45 units and one driveway connecting to Rte 101; the speed limit is 50 mph at this location and passing is allowed. The driveway is also fairly narrow, making it difficult to decelerate and enter from Rte 101. A flashing signal or actuated on-demand signal would improve safety and passing should not be allowed on Rte 101 at this location.
- o The entrance to Wilton Center Road is hard to find at night and should also be lighted.
- o Paint striping (edge and center lines) need to be renewed more often.
- o The west intersection of Intervale Road with Rte 101 is poorly defined, making it difficult to enter Rte 101.
- o Left turn lanes would be helpful at commercial locations in Bedford, and at the Meeting Place in Amherst, where a flashing or actuated signal would be helpful.
- o The Route 122 merge with Rte 101 in Amherst is difficult due to limited sight distance.
- o The traffic signal at Wilton Road and Rte 101 should provide a right-turn arrow to allow traffic to enter Wilton Road freely.
- o Rte 101 in Wilton was resurfaced two years ago and already shows pavement damage due to heavy trucks using the road. Roadway improvements recommended by the project should have full depth reconstruction of the roadway base so it stays in good condition longer.

Access Management

- o Access management is needed at locations in Wilton such as Rte 101 Convenience, House by the Side of the Road garden center and Bursey's. A left turn lane along this stretch of road would also be helpful.
- o On some weekend days, cars park along the shoulder of Rte 101 when the garden stores are very busy.
- o Egress management is particularly important because of the hazard of pulling out of driveways into high speed traffic.

Funding and Implementation

- o The Rte 101 Corridor Study should bring these issues to the attention of NHDOT.
- o The implementation plan should be prioritized on a corridor-wide basis so the most important improvements are made first, regardless of location.
- o A toll should be considered to finance improvements

Other

- o Construction along Rte 101 causes backups and safety hazards; there should be a police detail and variable message signs to warn approaching vehicles, and construction should not be allowed on Rte 101 during peak traffic periods.
- o The large bulletin board on Rte 101 near Route 31 north restricts sight lines.
- o In Washington State it is customary for slow vehicles to pull over if five or more faster vehicles are queued up behind them. This should be tried in New Hampshire.

Appendix B

Design Guidelines for Milford Industrial Area

Design Guidelines for Milford Industrial Area

The BROX property is a 313-acre tract of land acquired by the Town of Milford in 1999. Approximately 123 acres in the northern part of the property, through which the highway passes, is zoned industrial and designated for light industrial development. The southern portion of the property includes a new elementary school, with the remainder being reserved for future Town needs. Approximately 80 acres of this land are developable. (Figure 1)

Development of the BROX property represents a significant opportunity for the Town of Milford. Decisions on how to develop this land will involve tradeoffs between various factors and need to reflect the values of the community. Issues concerning access, market forces, and desired uses are all interrelated. Determining the most appropriate uses for the site involves understanding current market conditions, potential environmental and traffic impacts, and compatibility with the town's goals for income and job creation.

The property has been analyzed by the Nashua Regional Planning Commission (Figure 2), and a schematic subdivision layout was prepared for the town in November 2000 by Clough Harbor & Associates LLP (Figure 3). This information provides a valuable base from which to consider access improvements and design guidelines for the development. It should be recognized, however, that any industrial subdivision plan is likely to require modification as specific tenants come forward with specific needs and desires which may not fit a predetermined site. The strategy for leasing or selling parcels in a development of this type requires flexibility and an experienced developer, broker, and/or leasing agent working with or on behalf of the Town.

Objectives

There are three basic objectives for the development of the BROX property:

- Maximize return for Town as property owner
- Provide jobs and tax base
- Quality development

Meeting these objectives hinges on a development strategy that targets a specific segment of the market for industrial and/or commercial space.

Access

After the market, the primary issue posed by the BROX property is access. Several new access concepts serving the BROX property have been looked at, ranging from improvements to Perry Road (which connects the site to Route 101 via Old Wilton Road) to a new interchange with Route 101

Figure 1

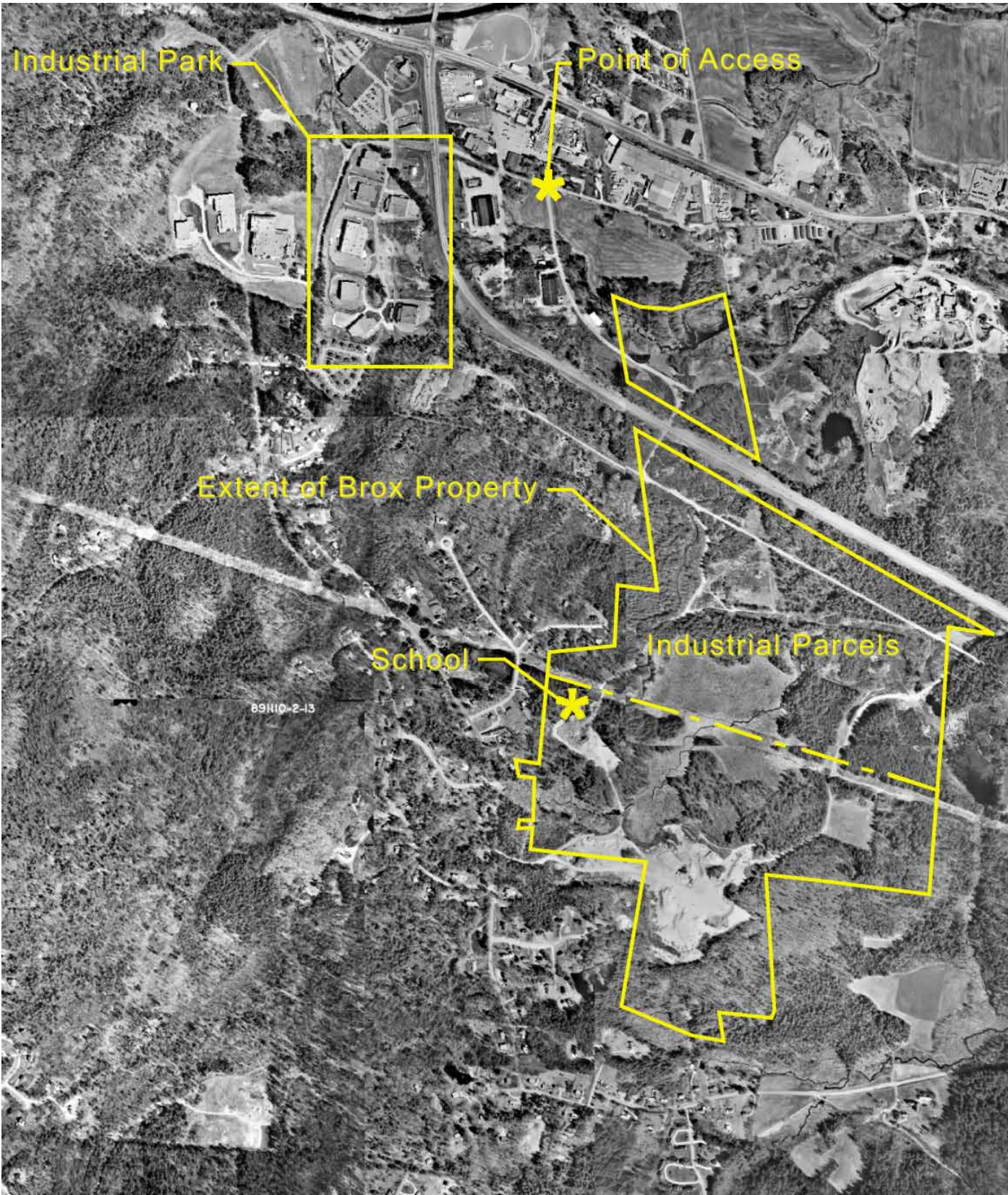


Figure 2

BROX Site Industrial Park, Milford, NH Potential Buildout Analysis: Feasible Subdivision Plan

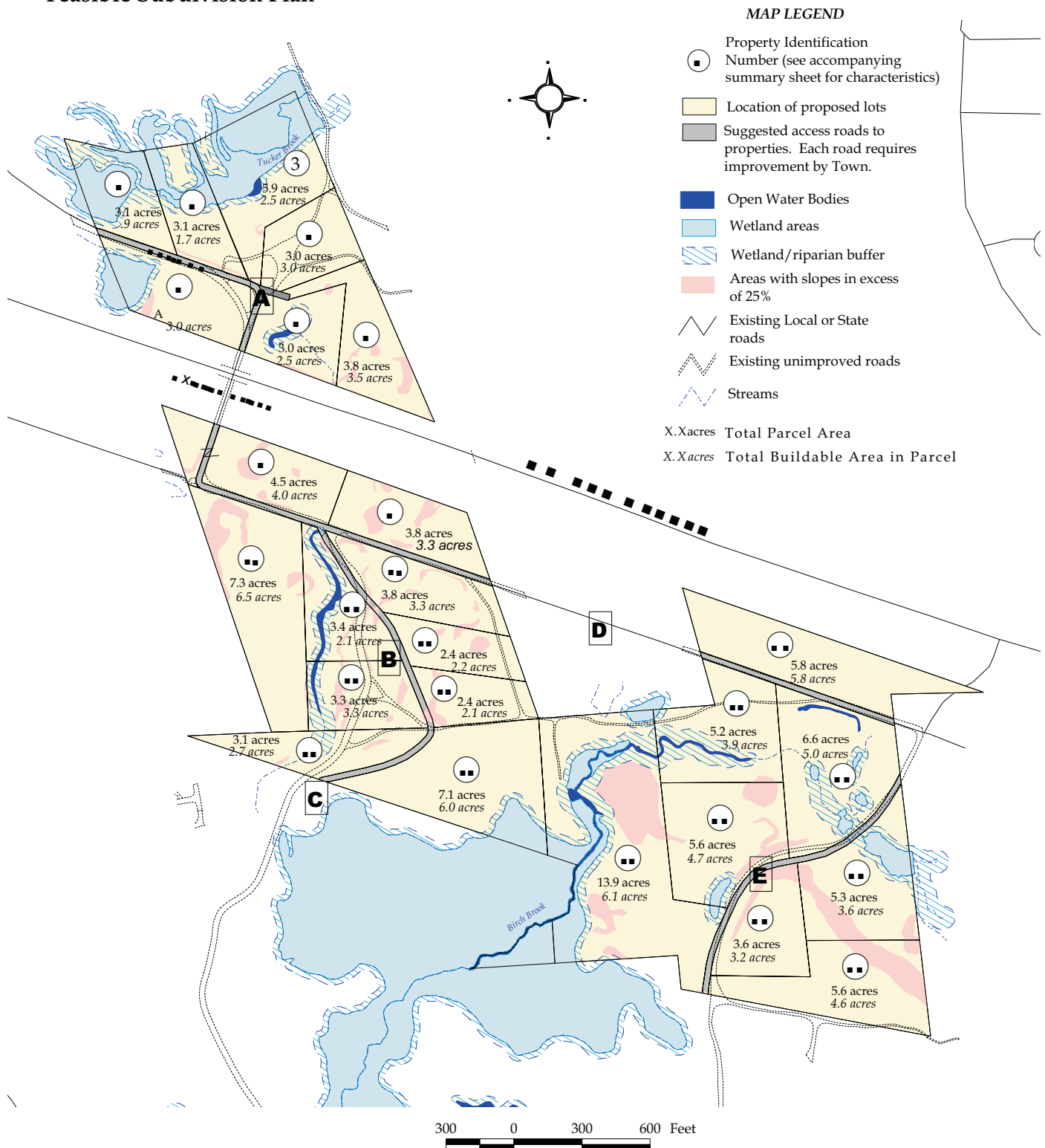


Figure 3



The proposed extension of the Route 101 bypass as described in this report would alleviate the current congestion at the Old Wilton Road intersection and would provide excellent access to and from the east. Therefore, a new interchange does not appear to be necessary to provide needed access to the BROX property. An interchange would have significant land use impacts, and if sited where Route 101 currently overpasses the unimproved service road, would occupy a large portion of developable land and would necessitate modifications to the current subdivision and internal circulation scheme. An interchange would also have wetland impacts, depending on its configuration and location. Consideration of a new interchange on Route 101 needs to be coordinated with town-wide corridor improvements, including those identified in the recent Milford Traffic Study.

Potential uses are likely to vary in their impacts on traffic to and through the site. For example, a distribution facility would likely create significant additional truck traffic and require a location closer to Route I-93 than the BROX site. Other uses, such as light manufacturing/assembly or research and development, would likely have a different impact on traffic with potentially more employee automobile trips but fewer truck trips and would be more compatible with a location in Milford.

Market

Without undertaking a full-scale market analysis, a focused look at the current trends for industrial land in the region and vacancy/sales rates for other industrial parks in the area can indicate the most likely uses that can be attracted to this particular site. The site, as it exists today, has both assets and limitations that will attract or deter various potential tenants.

In order to assess the market issues, RKG Associates, Inc. prepared a conceptual market study for an industrial and commercial development on the property. The RKG study is included as a Appendix C to the Route 101 Corridor Plan. The study concludes that with appropriate actions by the town, absorption of the 80± acres of buildable land could occur within a twenty to twenty-five year time frame, assuming a mix of light industrial and commercial uses, including firms engaged in research and development of new products (commonly referred to as “R&D”).

Factors in favor

Milford's industrial base and workforce

Milford has a trained workforce, a major consideration by employers in locating their facilities. The town has done relatively well in maintaining its industrial base over the past 20 years, a time during which manufacturing employment has declined regionally.

Quality of Life

Milford has an excellent quality of life due to its size, setting, historic urban fabric, schools, and recreational opportunities.

Site Characteristics

The BROX site is relatively easy to develop and is an attractive, largely wooded site with visibility from Route 101.

Factors to Overcome

Access

The BROX site is relatively far from the Interstate highway system. Access to the site is via the Route 101 bypass and Old Wilton Road intersection, both of which are experiencing worsening peak period congestion. However, the roadway improvements in the Route 101 Corridor Plan will largely alleviate these problems when the bypass is extended and widened to four lanes. The key factor in this regard is the schedule for improvements, which are proposed for the medium term (5 to 10 years).

Regional inventory of industrial land

The RKG conceptual market study identified a large inventory of developable industrial land in the Nashua and Manchester region, much of it more directly accessible from I-93 than the BROX property. Development of BROX will therefore depend on the positive factors listed above as well as access improvements allowing it to compete with alternative sites.

Image at entry

Access to the property is via Old Wilton Road and Perry Road on which some property has been developed with relatively low quality, unattractive industrial buildings. If the targeted market segment for the property is of higher quality, measures should be taken to improve the entry condition, as suggested below.

Strategy

Given the market conditions, site characteristics, and town objectives for development, the following strategy for development is recommended.

Target manufacturing, R&D, and office uses.

Marketing of the site is necessary to identify and secure appropriate tenants. The market study suggests a mixture of light manufacturing, (including so-called “research and development” or small “high-tech” companies) and small commercial service firms.

Emphasize the quality niche.

There are basically two alternative strategies for marketing the site. One is to compete on price, which may not be successful given the large inventory of competing land in the region. The other is to distinguish the property by creating a quality industrial park. The BROX development should be of relatively high quality, to help differentiate the property from competing sites and to attract tenants that will provide good jobs and add to the town's tax base. It is therefore important that the property should be developed to provide good infrastructure and amenities, and that each tenant site should be appropriately developed. One poor quality development will reduce the value of the entire property. However, the quality features should not price the property out of competition with other quality development sites.

Utilize the natural features of the site.

The BROX property benefits from the existing woods, ponds, and wetlands, and these features should be treated as the key to site design and landscaping, as discussed below.

Use design guidelines to maintain level of quality.

In order to maintain a level of quality necessary for the marketing strategy, design guidelines for site development and buildings should be carefully applied. Recommended guidelines are included in this appendix.

Site Analysis

The BROX property has several assets:

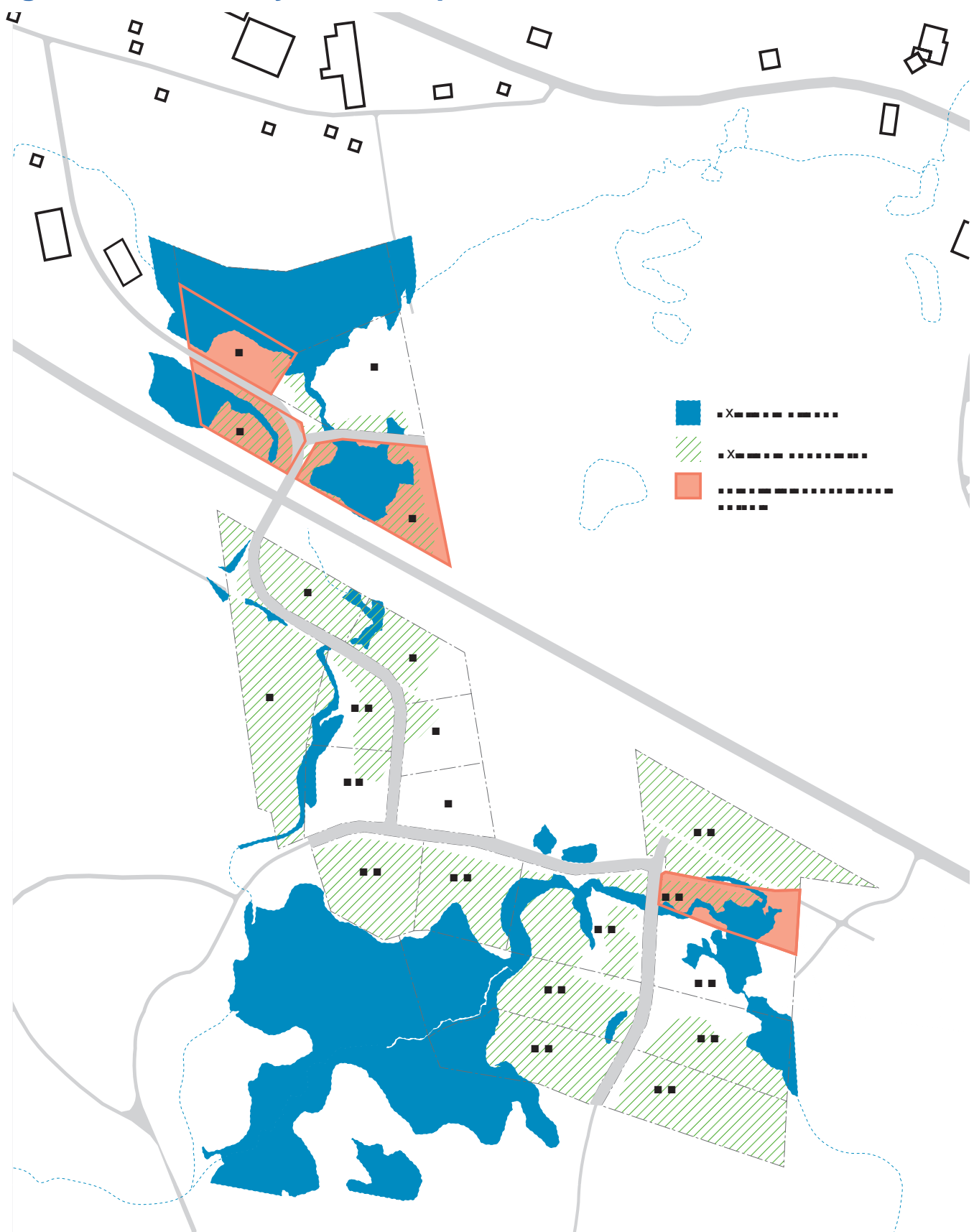
- Extensive tree cover
- Several wetlands
- Wooded knolls and ridges

In addition, there are other less favorable characteristics that must be addressed.

- Not much visibility from Route 101 (address through good signage and advertising of the property; target tenants who do not require high visibility).
- Bordering power line and neighborhood (use existing woods to provide an effective visual buffer).

In addition, the presence of wetlands and streams makes some of the sites in the subdivision layout difficult or impossible to develop at reasonable cost (see Figure 4 Potentially Undevelopable Sites)

Figure 4 - Potentially Undevelopable Sites



Utilizing Site Characteristics

The BROX site is largely wooded with a variety of tree species, including oak, maple, white pine, white birch, and hemlock. These trees should be retained to the extent possible.

The industrial park's image should be one of buildings sited in the woods with predominantly native plant materials, rather than a suburban image of buildings fronting on the roadway and surrounded by lawns and traditional foundation landscaping.

Buildings should be sited in relation to the best site features such as stands of mature trees so that views from buildings, paths, and driveways are optimized.

A wooded buffer should be maintained along the roadways, screening the buildings. In locations where there are grassy areas instead of woods along the road, native tree species should be planted in this buffer area. (See Figure 5, Screening)

A path system should be created which includes two components: a walkway in the buffer area running along the roadways, and a perimeter loop at the rear of the individual lots, running along the edge of the wetlands and streams. These systems will serve as amenities for the people who work in the buildings and are expected to be active before and after working hours and during lunch hours. (See Figure 6, Path and Trail System)

A small open space should be created as an additional amenity and visual focus. A suggested location is where the internal roadway crosses the stream and associated wetlands near lot 18.

Figure 7 illustrates site development for a light industrial facility in conformance with the recommended guidelines.

Design Guidelines

Elements that influence the image of the industrial park include those in the public realm environment such as streetlights, signage, street signs and traffic control fixtures, entry or gateway elements into the park itself, and landscaping along interior roads. Other elements are more oriented to the development of a particular parcel within the industrial park, such as signage for company names and addresses, small-scaled entry elements or gates, setbacks for parking and buildings, and perhaps materials for buildings. Depending on what tenants are desired, a particular look in signage and fixtures – say “high-tech”, or “green” – could influence a prospective tenant's decision. Again, guidelines can raise the perceived and real quality of the development; their objective should be to match the overall appearance and level of quality and amenity to the targeted type of use. A research and development park, for example, would have a different appearance from a regional distribution facility or a mixed site.

Figure 5 - Screening Areas

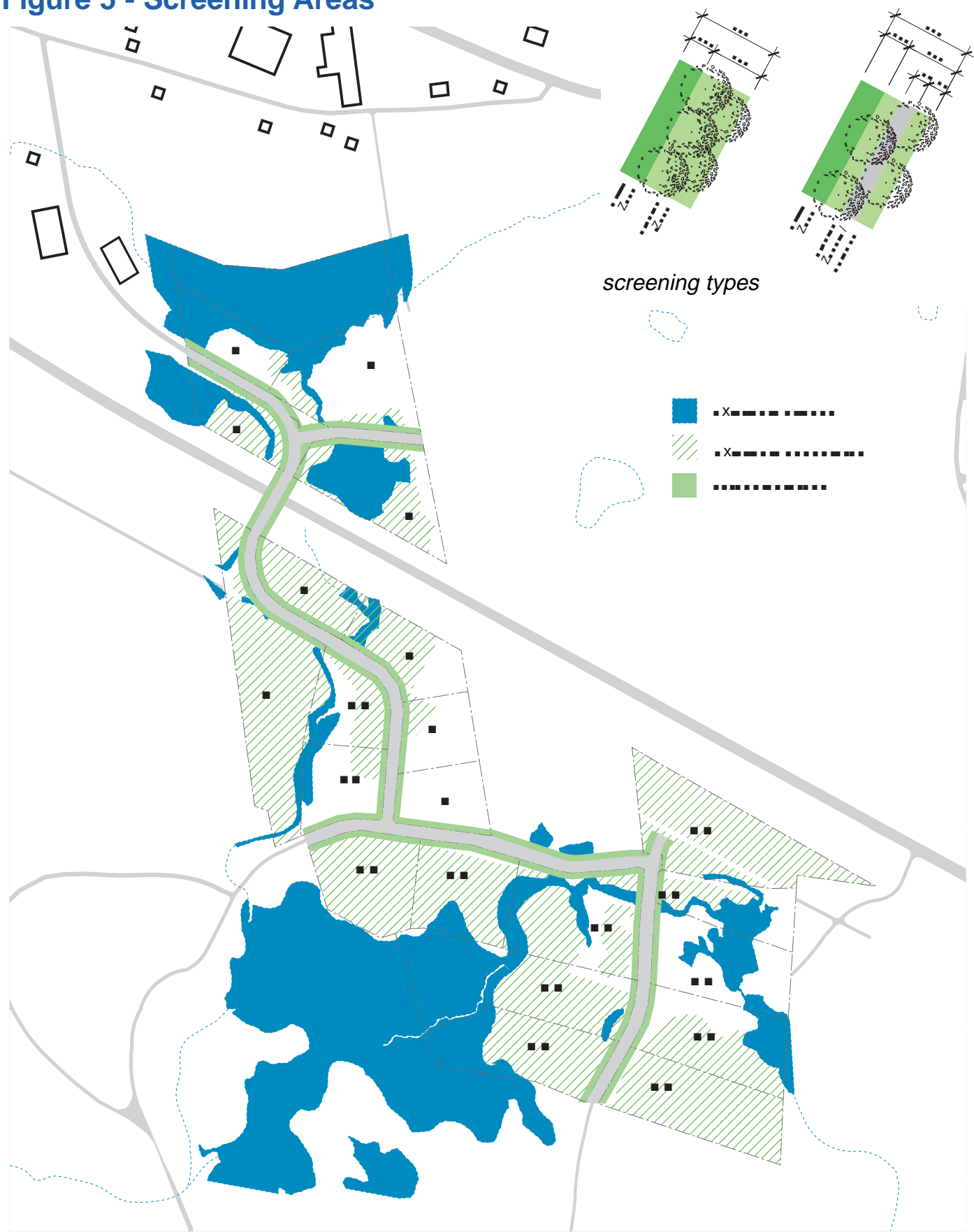


Figure 6 - Path and Trail System

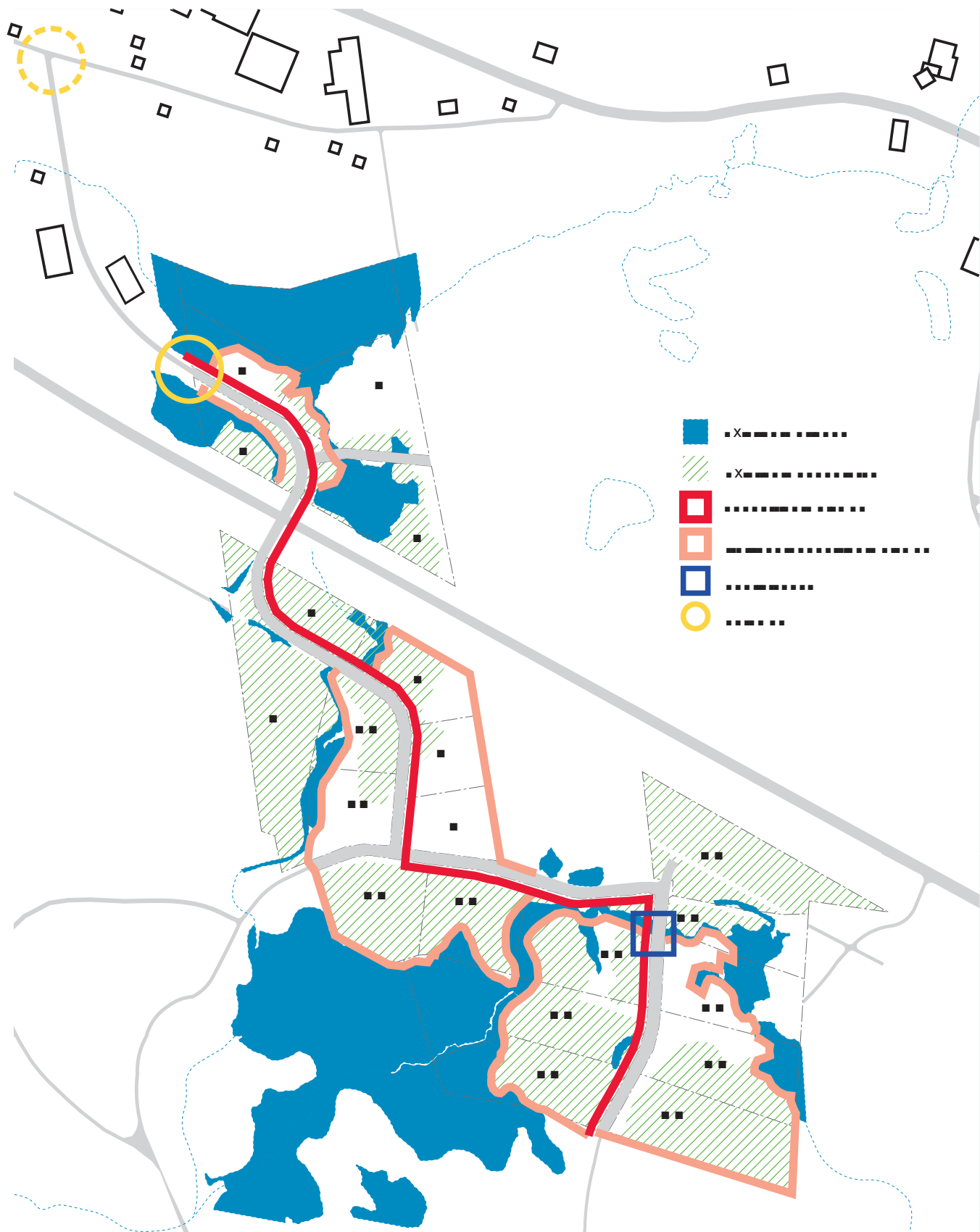
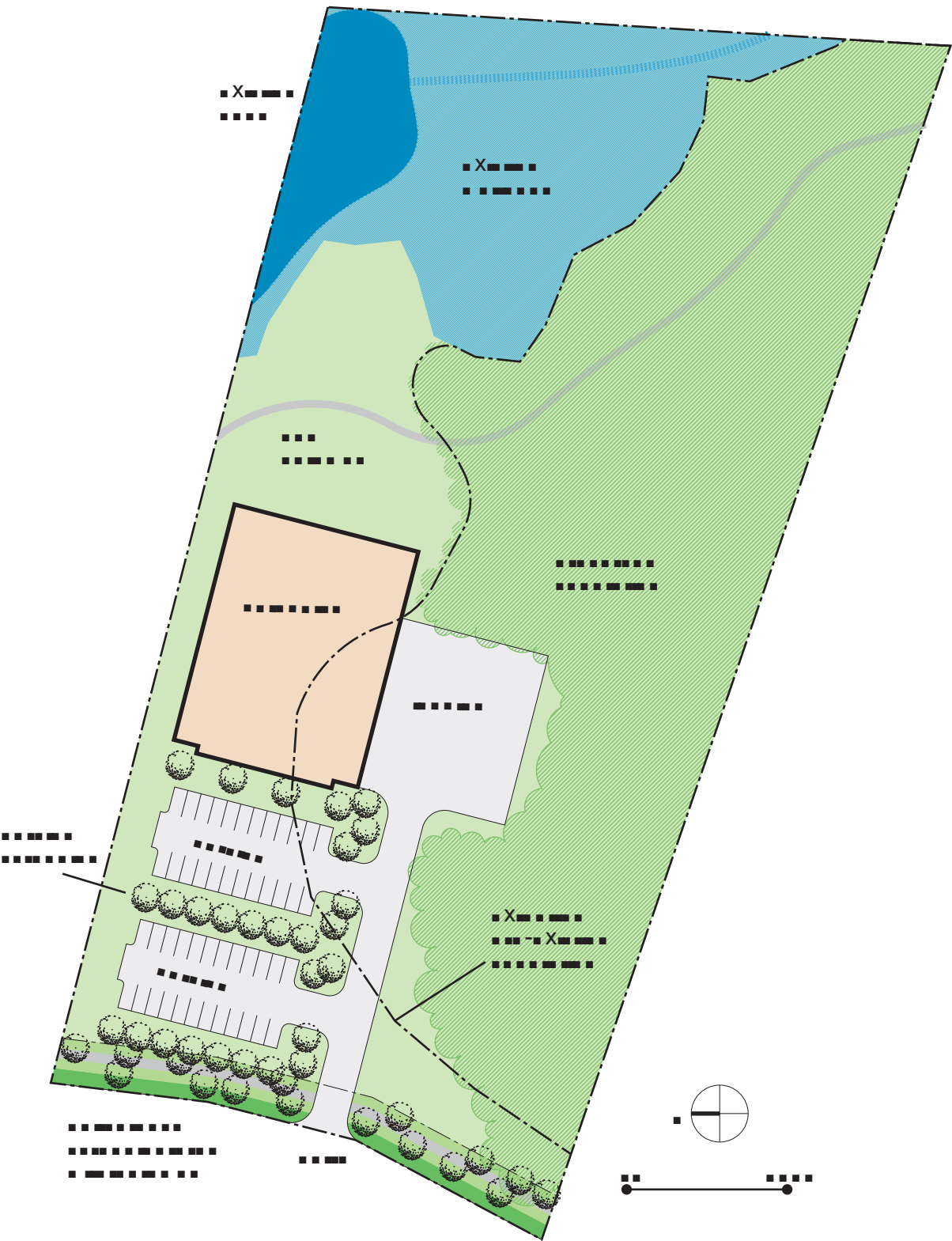


Figure 7 - Sample Site Layout



Since the property is currently town-owned, guidelines can be implemented through covenants or lease provisions. However, there needs to be a clear and consistent relationship between the guidelines for the site and the Town's zoning, subdivision, and site plan review regulations. One option is an overlay district encompassing BROX and the Perry Road area.

There are two ownership/management scenarios that would influence the choice of streetscape elements and other site amenities. If the town retains ownership of the property – and assumes a maintenance role – lighting fixtures and other standard elements will most likely be the same fixtures that are stocked by the town. If the entire property is sold to a private developer, selection can be made from a wider range of fixtures.

There are also technical issues in how the individual sites are developed, depending on whether they are sold, ground-leased, or developed and leased. Since these questions will not be resolved for some time, the guidelines refer to a “management entity” which could be the town, the developer, or a property manager. In any case, the management entity should develop guidelines for signage to be used at lot entrances.

1.0 Applicability

The guidelines should be applied to three areas in order to encourage consistent development in this part of Milford:

- the BROX property
- the parcel facing Route 101 and surrounded by the BROX property on three sides
- the Perry Road area

2.0 Site Layout

2.1 Buildings should be set behind a wooded buffer (see 3.2)

2.2 The siting of buildings should take advantage of site features and amenities

2.3 Parking should be well-screened from the roadway.

2.4 Pedestrian access should be provided from the building to the industrial park path system

3.0 Landscaping Standards

All regulations and restrictions set forth in the *Milford Site Plan Regulations Article 4.020 Landscaping Standards* shall apply to new development. In addition:

3.1 Existing wetlands, streams, and vegetation should be incorporated and protected. Outstanding tree specimens should be tagged and protected during construction.

3.2 Buffers and Screening

- A 30' wooded buffer should be provided along the industrial park roadway and parcel boundaries abutting residential uses.
- The buffer along street may be thinned to permit views through the trees into the site.
- Where existing vegetation not suitable, a planted buffer of white pine and birch with vegetated understory should be installed.

3.3 Parking Areas and Loading Docks

Refer to sections 4.024 - 4.025 of the *Milford Site Plan Regulations* shall apply.

- Parking areas should incorporate existing vegetation or new landscaping.

3.4 Storm-Water Detention Basins

Refer to Article VIII Erosion and Sediment Control Plan of the Milford Site Plan Regulations which shall apply.

- Storm-water detention basins designed should be designed as naturalistic features that contribute to the aesthetics of the site

3.5 Outdoor amenities (e.g., additional paths and sitting areas) are encouraged.

4.0 Street Standards

4.1 Utilities should be placed underground.

4.2 Pathways

- A 6 foot compacted stone dust pathway should be provided within the roadside buffer for pedestrian circulation through the development. [This path should be maintained by the development management entity].
- Easements should be required near outside edge of each lot to accommodate a potential future bike trail and pedestrian nature walkway at the perimeter of the industrial park. Easements should skirt the edges of wetlands.

4.3 Entry and Gateway Elements

- Refer to section 5.040 *Driveway Entrance Permits* of the *Milford Site Plan Regulations* which shall apply.
- Gateway landscaping should be provided at the main entrance to the industrial park.
- Directional signage at Route 101/Old Wilton Road and at the Old Wilton

Road/Perry Road intersection. These intersections should receive additional gateway landscaping.

- Entrances to individual lots should be appropriately landscaped with an identification sign conforming to a district standard signage design to be promulgated by the management entity.

4.4 Common Open Space

- In addition to the roadside path system and perimeter trail, a small park feature should be provided at the wetland crossing near lot 18. This area should provide a sitting area taking advantage of the view of the stream and wetland. Additional small common open spaces are encouraged at other locations in the industrial park

5. Lighting Design

5.1 Lighting Style and Size

- The style of street lighting should be consistent throughout site
- Lighting on individual lots may vary if separated from the street by the buffer area. Lighting should enhance the building character; and be in scale with the building.

5.2 Lighting Impacts

- All lighting should be designed to prevent undesirable incidental illumination
- Fixtures shielded and direct light downward.
- Spot lighting is discouraged unless carefully designed to avoid incidental illumination.

6.0 Signage Design

Refer to section 7.606 Sign Ordinance of the Milford Zoning Ordinance, which shall apply.

6.1 Traffic control fixtures and street signs should match the existing standards of the Town of Milford.

6.2 Advertising

- No billboards or advertising on exterior signage is permitted except a sign at the entry to each lot identifying the address and business. Rooftop signs visible from Route 101 should not be permitted.

6.3 Style and Design

- Signs attached to the buildings should be integrated with the architectural design and located to be visible primarily from the on-site parking.

-
- Typography, color, and design should be internally consistent. A graphic standard for all entry signs should be developed by the management entity.
 - Logos are permitted within the entry sign if consistent with the graphic standard.
 - Entry signs should be ground mounted so as to be visible from the industrial park street system, with a maximum height of 5 feet and area of 15 square feet.

6.4 Sign Materials and Lighting

- Materials for attached signs should be compatible and consistent with the specific building architecture.
- External light sources for signs should be shielded from glare.
- Entry signs may be internally or externally illuminated, depending on the standard developed by the management entity.

7.0 Architectural Design

7.1 Buildings should be situated so that a minimum number of mature trees are removed and the natural character of the existing site is maintained.

7.2 All architectural designs should be compatible with the character of the district.

7.3 Building features and details should be of high quality and appropriate to the architecture of the building as a whole.

7.4 Pre-manufactured buildings not permitted.

7.5 Split concrete block facades are permitted, but no unclad concrete masonry units may be used on front building elevations.

Appendix C

RKG Market Study of the BROX Property

**NON-RESIDENTIAL MARKET STUDY
For the BROX PROPERTY**

**In the
TOWN OF MILFORD, NH**

DRAFT REPORT
APRIL 9, 2002

Prepared for:

Wallace Floyd Design Group
273 Summer Street
Boston, MA 02210-1510
(617) 350-7400
Attn: Mr. James Purdy

Prepared by:

RKG Associates, Inc.
277 Mast Road
Durham, NH 03824
Tel: (603) 868-5513
FAX: (603) 868-6463
Internet: www.rkg1.com

Table of Contents

A. Introduction and Summary	1
B. Project Area, the Region, the Town and its Zoning.....	2
C. Demographic Trends and Projections	4
D. Labor Force and Unemployment Trends	7
E. Business and Employment Trends.....	8
1. Employment Trends	11
2. Expanding Firms in the Nashua and Manchester PMSA.....	15
3. Major Industries and Firms in Milford	16
4. Milford Employment Base by Property Type.....	16
5. Average Wage and Real Estate Tax Comparison	18
F. Local and Regional Real Estate Supply	19
1. Current Availability of Land in the Region	19
2. Current Availability of Buildings in the Region	21
G. Development Implications	23
H. Conclusions and Recommendations.....	26

A. Introduction and Summary

RKG Associates, Inc. (RKG) was retained by Wallace Floyd Design Group (WFDG) to analyze non-residential real estate market conditions in the Town of Milford and the surrounding region of central southern New Hampshire. The purpose of this analysis is to identify likely commercial and industrial demand that would be attracted, over the long term, to an industrially zoned portion of a 313-acre tract, known locally as the Brox property, adjacent to Route 101. This analysis will also assist WFDG in preparing design guidelines for a proposed business park at the project site. It should be noted that this study is not intended to be a comprehensive real estate market analysis, nor a financial feasibility study for constructing a new business park.

The methodology employed in the study involved an evaluation of recent demographic, labor force and employment trends for Milford and the region for an indication of future non-residential demand for the land and buildings. These historic demand indicators were then compared to the supply of real estate in the region for an understanding of absorption patterns, pricing levels, as well as future opportunities for development at the Brox site.

The report is presented, after the summary, in the following sections:

- 1) The project site, neighboring land uses, and locational attributes are discussed.
- 2) Demographic changes in the town and the region are identified, including a discussion of forecasted changes, based on Claritas data, over the next five years.
- 3) Business and employment trends are also presented, which provide a basis for non-residential real estate absorption in the town and region. These trends are compared to the available supply of competing properties for an understanding of how the Brox site will compete for this supply.
- 4) The final section estimates the potential absorption of the project area and presents some development options that would affect future absorption of land at the site.

In summary, non-residential market conditions in central southern New Hampshire have been very positive over the last five to ten years, and the Town of Milford has also benefited. However, it is likely that any proposed non-residential uses for the project site would be considered highly speculative in today's financial market, especially considering the economic softening that started in 2000, that was further hampered by the tragic events on September 11, 2001. In addition, any proposal at the project site would compete with approximately 1,100 acres already on the market in the region, as well as an inventory of 4.6 million square feet (SF) of available building space. Most of these properties have better locational advantages than the project site, including their proximity to the interstate highway network, as well as having lower local real estate taxes.

In light of these competitive regional conditions, Milford has a relatively small supply of available industrial sites serviced by a range of utilities, such that the opportunity to make the project site market ready appears strong. Realistically, the absorption of the 80± acres could take between

15 and 50 years to achieve full build-out, depending on economic cycles, availability of utilities, future zoning, pricing, development standards, and marketing, to name a few key factors.

Obviously several options should be considered for the project in order to improve market acceptance, as well as development feasibility. Several points to consider are discussed in the text, which would likely accelerate potential absorption. These include the following:

- Provide municipal water and sewer
- Revising zoning to allow office users smaller than 15,000 SF
- Consider minimum building standards
- Establishing a gateway to the project area
- Maintain competitive, if not low pricing

It would be reasonable to assume that incorporating these aforementioned considerations with the project, that absorption of the 80± acres could occur within a twenty to twenty-five year time frame.

B. Project Area, the Region, the Town and Zoning

The Town of Milford is located in central southern New Hampshire and is in fairly close proximity to New Hampshire's two major population and employment centers. The City of Manchester is approximately 15 miles northeast of Milford, while the City of Nashua is roughly 10 miles to the southwest. Milford is surrounded by seven rural towns including Amherst and Hollis to the east, Brookline and Mason to the south, Wilton to the west, and Lyndeborough and Mont Vernon to the north.

Regional access to Milford is provided by State Route 101, a two-lane road that runs between Manchester, where it connects with the interstate highway network, and Keene, in the western part of the State. A limited access bypass extends though Milford between Amherst and the western part of town, near Wilton, allowing vehicular traffic on Route 101 to skirt downtown Milford. Most of the industrial development in the town is at the western terminus of this bypass.

State Route 101-A, which runs through the downtown, also provides access to Nashua and the Everett Turnpike (Route 3) through neighboring Amherst and Merrimack. Most of the post-1980 commercial development in Milford has occurred along the eastern portion of this corridor, near an interchange with the bypass. Milford Street in Amherst and Merrimack, and Amherst Street in Nashua, as Route 101-A is referenced, has transitioned into a major commercial corridor complete with suburban shopping malls, office parks and industrial developments. State Route 13, a two-lane north/south road, also provides access to the Fitchburg/Leominster region of central Massachusetts through neighboring Brookline.

Milford has evolved into a bedroom community for the region, as well as sustained its own industrial base. Since Milford is in close proximity and accessible to both Nashua and Manchester, the region analyzed for demographic characteristics is primarily Hillsborough County. For economic purposes the region was further divided into two sub-regions referred to, as the Nashua Primary Metropolitan Statistical Area (PMSA) and the Manchester PMSA, in order to have a better understand of the industry characteristics of each sub-region.

The Brox property, or the project site, is a town-owned parcel of roughly 313 acres, situated in the center portion of town between the Route 101 bypass and Mason Road. The parcel is located in both an industrial zone (123 acres) and residential zone (190 acres). This analysis only evaluates the industrial-zoned portion of the site, which is bisected by the Route 101 bypass, leaving a 27 acres portion on the northern side, and the remaining 96 acres to the south.¹ An estimated 80± acres of the industrial portion have development potential after accounting for wetlands (37 acres), future right-of-ways (9 acres) and a stump dump (1 acre). A preliminary plans show this area subdivided into either 21 lots (CHA) or 25 lots (NRPC), ranging in size from 3 to 14 acres.

Primary access to the site is proposed to be from Perry Road, which will lead to the portion on the northern side of the bypass, from Old Wilton Road (Route 101A). This access leads through an established industrial area. The proposed road then would lead under the bypass to the remaining portion of the site, where it runs parallel to the bypass. Private unimproved roads meander through this portion of the site, which could be upgraded and connected to Heron Pond Road adjacent to a recently constructed elementary school. This back-door access in turn would intersect with Whitten Road and lead through an established residential area back to Phelen Road and the terminus of the Route 101 bypass. Limiting commercial traffic to the proposed secondary access should be considered as a means to reduce any potential conflict that may result between commercial and residential land uses. The project site also lacks major utilities, such as water, sewer, electricity, telephone, etc, which, in addition to the roads, will need to be extended into the site.

In general, this site is primarily undeveloped backland that lacks direct access from the Route 101 bypass. The traffic light at Old Wilton Road and the Route 101 bypass is less than a mile to the northern portion of the site (Perry Road), and it is more than a mile to access the southern portion (secondary side) of the site. In other words, proposed access from the Route 101 bypass appears convenient, however, access to this portion of Milford from either Nashua (Route 101A) or Manchester (Route 101) can be problematic depending on the time of day and traffic conditions.

Permitted uses in the industrial zoning district are limited to the following: a) Harvesting and/or processing of natural resources; b) Light manufacturing; c) Office buildings in excess of fifteen thousand (15,000) square feet (SF); d) Research and development; e) Distribution and mailing facilities; f) Processing and warehousing; g) Telecommunication facilities.

There is no minimum lot size or frontage requirement if water and sewer are available to a user of the site. A minimum lot size of 40,000 SF is required for septic/well users. In most cases, industrial and office users shy away from sites that lack sewer and water, primarily due to the cost associated with large and sophisticated septic systems, and their periodic replacements.

Conclusions: The subject site is located in the central portion of Milford, somewhat isolated from the Route 101 bypass and downtown Milford. Roughly 80 acres will be available for

¹ The site information presented in the analysis is based on two preliminary subdivision evaluations: 1) the Clough, Harbour & Associates LLP (CHA) schematic design study, dated November 30, 2000, and 2) the Nashua Regional Planning Commission (NRPC) subdivision plan, dated December 2000.

industrial uses, as currently zoned. The site, as proposed, will have convenient local access to the Route 101 bypass, although regional access to Route 3 (Everett Turnpike) in Nashua or the interstate highway network in Manchester is more than 10 to 15 miles away. In addition, these routes can be problematic due to traffic congestion, which may discourage some potential users. Some of the major manufacturers in Milford are located within the immediate neighborhood of the primary access point to the site, suggesting minimal, if any, potential conflict. However, the proposed secondary access to the project area extends through an established residential neighborhood, suggesting a possible conflict could arise.

C. Demographic Trends and Projections

This section analyzes demographic trends in the Town of Milford, as well as those in Hillsborough County. The purpose of this section is to establish a baseline of population and household data, and the use this information to forecast changes to 2006. Demographic forecasts were obtained from Claritas, Inc., a commercial provider of population and households data.

Population and Household Trends and Projections

Since 1980, population in the Town of Milford has increased by more than 4,930, to a base of 13,618 persons in 2001. The increase during the 1990s (1,820) was almost half the size of the increase during the 1980s (3,110). The average annual growth rate between 1980 and 2001 was roughly 2.7% in Milford, and only 1.4% per year during the 1990s. Population in Hillsborough County also increased between 1980 and 2001, but at a somewhat slower rate as indicated by an average annual increase of 1.9%. ²

**Table 1: Milford and Hillsborough County, NH
Population and Household Trends**

Population	1980	1990	2001 (e)	2006 (f)
Town of Milford	8,685	11,795	13,618	14,270
# change	N/A	3,110	1,823	652
% change	N/A	35.8%	15.5%	4.8%
Hillsborough Cty	276,608	336,073	384,201	401,287
# change	N/A	59,465	48,128	17,086
% change	N/A	21.5%	14.3%	4.4%
Households	1980	1990	2001 (e)	2006 (f)
Town of Milford	3,148	4,463	5,471	5,833
# change	N/A	1,288	1,008	362
% change	N/A	41.8%	22.6%	6.6%
Hillsborough Cty	95,820	124,567	150,707	159,937
# change	N/A	28,747	26,140	9,230
% change	N/A	30.0%	21.0%	6.1%

Source: US Census & Claritas, Inc.

² Claritas, Inc. estimates a 2001 population of 13,618 persons in Milford, which is 83 persons higher than the 13,535 identified in Census 2000. Claritas's household estimate for 2001 of 5,471 in Milford is also ahead of the 5,316 households reported by Census 2000, representing additional growth over the last year. For Hillsborough Counties, Claritas's 2001 population estimate (384,201) is higher than reported in Census 2000 (380,841), and households (150,707) are higher than Census 2000 (149,961), but consistent with historic trends.

Households in Milford increased at a faster pace than its population since 1980, as evidenced by the average annual increase of 3.5% during this 21-year period. In fact, Milford captured 4.2% of the household growth in Hillsborough County between 1980 and 2001. As a result Milford's representation of Hillsborough County's households has risen from 3.3% in 1980 to 3.6% representation in 2001.

Five-year projections indicate an increase of roughly 360 households in Milford, or a 6.6% gain. Household growth in Milford represents 3.9% of the projected increase in Hillsborough County. Households in the county are also projected to increase by 6.1% in the next five years.

Income Characteristics

Milford's median household income in 2001 is estimated at \$56,082, which is 2.3% lower than the median income for Hillsborough County (\$57,378). Since 1980, median income levels in Milford have grown at a faster rate than those in the county, suggesting that this disparity in incomes has declined somewhat. In addition, median household income has grown at a faster pace than the rate of inflation (CPI) since 1990, suggesting real growth in value and more disposable income. Five-year forecasts indicate that median household income in Milford will grow at a faster pace than projected for Hillsborough County.

**Table 2: Milford and Hillsborough County, NH
Median Household Income Trends**

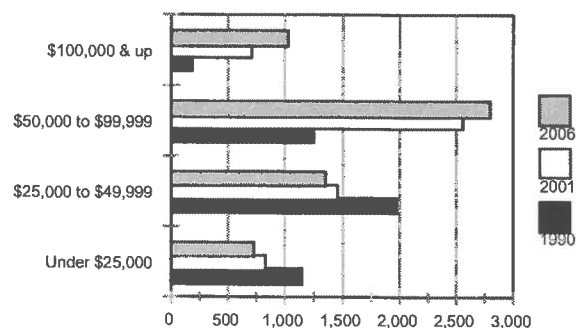
	1980	1990	2001	2006
Town of Milford	\$17,377	\$38,821	\$56,082	\$63,785
% change	N/A	123.4%	44.5%	13.3%
Hillsborough Co.	\$18,696	\$40,440	\$57,378	\$64,377
% change	N/A	116.3%	41.9%	12.2%
Boston MSA CPI-U	80.6	136.3	190.9	N/A
	N/A	69.1%	40.1%	N/A

Source: US Census, Claritas, Inc. & Bureau of Labor Statistics

Income Distribution of Households

Figure 1: The number of households in the Town of Milford increased by more than 1,820 between 1990 and 2001. There was also a shift in households from the lower income brackets to the higher levels. In fact, the number of households earning \$50,000 or more increased by 1,840 during this period, and 28.3% of this increase, represented households with incomes of \$100,000 or greater. As a result, roughly 12.5% of 2001 households have incomes of \$100,000 or more, and by 2006 it is projected that this group will represent 17.4% of total households.

Households by Income (1990-2006)
Town of Milford, NH

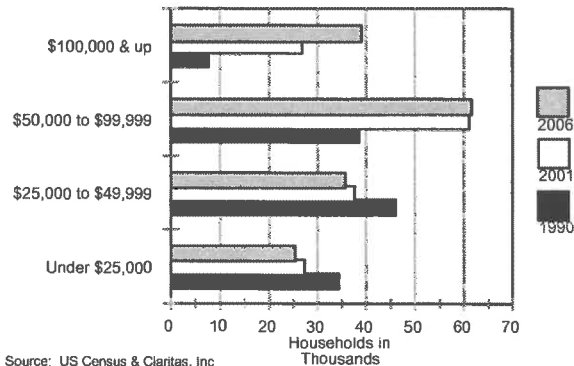


Source: US Census & Claritas, Inc

Five-year forecasts project a 6.6% increase in the number of households. This increase will primarily occur at the upper income levels, or it will be fairly evenly divided between the upper two income brackets.

Figure 2: The number of households in Hillsborough County increased by 26,140 between 1990 and 2001. In addition, there was a shift in households from the lower income brackets to higher levels. In fact, the number of households earning \$50,000 or more increased by more than 41,900 during this period, and 45.9% of these households had incomes of \$100,000 or more. As a result, roughly 14.4% of the households in 2001 have incomes of \$100,000 or more, and by 2006, it is forecasted that this group will represent 24.0% of total households.

Households by Income (1990-2006)
Hillsborough County, NH

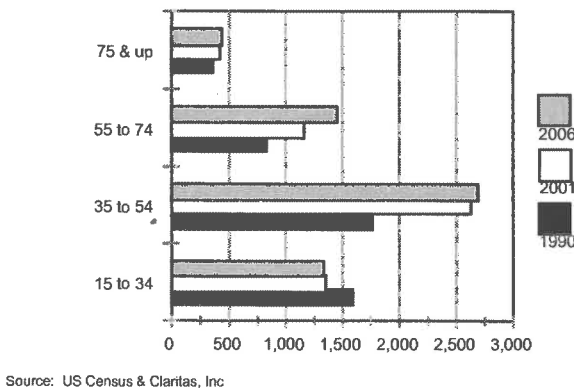


Five-year forecasts project a 6.1% increase in the number of households, and most of the increase will primarily occur in households at the upper income levels, or those with incomes of \$100,000.

Age Characteristics of Households

Figure 3: Since 1990, most of the growth in households in the Town of Milford occurred in middle age households (35-54), followed by the elderly (55 to 74), and a small amount of the advanced elderly (75 & up). This gain offset modest declines in younger households (15-34).

Households by Age (1990-2006)
Town of Milford, NH

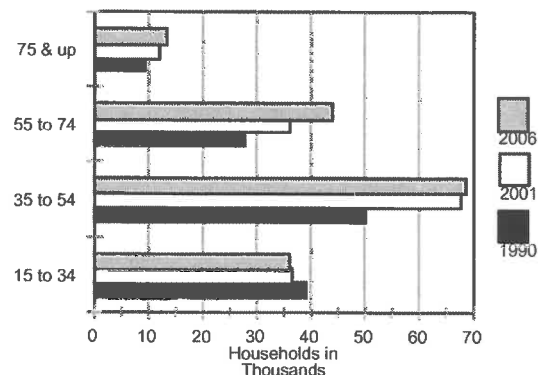


Five-year forecasts suggest that most of the growth will be in elderly households, most likely due to existing households aging in place. A modest increase in the number of the advanced elderly is also projected, as well as small gains in middle age households. By 2006, the elderly will represent 24.5% of total households, while the advanced elderly account for another 7.2%.

Figure 4: Since 1990, growth among middle age householders (35-54) represents the largest increase of any age cohort in Hillsborough County. This was followed by gains in the elderly and the advanced elderly households, which offset declines in younger households (15-34).

Five-year forecasts indicate the elderly will experience the most gain, with modest growth in the advanced elderly. Middle age households are also projected to experience a small increase, while younger households will decline marginally. By 2006, the elderly will represent 27.2% of total households, while the advanced elderly will account for another 8.0%.

Households by Age (1990-2006)
Hillsborough County, NH



Source: US Census & Claritas, Inc

Conclusions: The Town of Milford has experienced steady population and household growth since 1990. In fact Milford households have increased at an average rate of 2.1% per year, slightly ahead of the rate indicated for Hillsborough County (1.9%). In addition, households in Milford have become more affluent during this time frame, as median income is estimated at nearly \$56,100. This percentage increase in median household income was higher than that indicated for the county, and higher than the growth rate of inflation.

Five-year forecasts indicate continued household growth at an average annual rate of 1.3% in Milford. The elderly (55 and up) are projected to increase by nearly 20.8% over the next five years, which is slightly higher than the increases indicated for Hillsborough County (19.1%). However, middle-aged households (35 to 55) are forecasted to experience only nominal increases in size while the younger households are projected to decline during this time period. This decline in younger households could impact local labor force characteristics and slow future economic growth.

D. Labor Force and Unemployment Trends

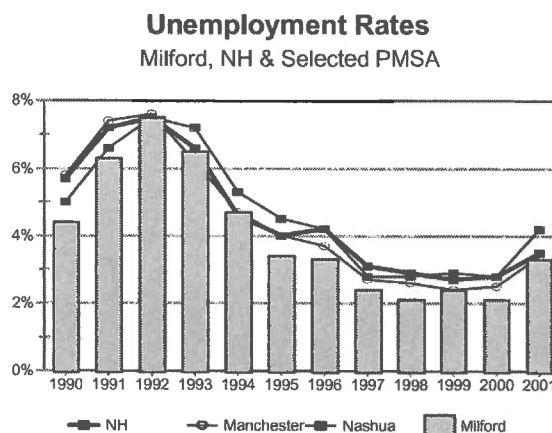
Between 1990 and 2001 the resident labor force in the Town of Milford increased by more than 320 participants, or 4.5%. This finding suggests that only 17.6% of the new persons (1,820 persons) in Milford were labor force participants, while the other 82.4% were non-participants, such as children, non-working household members, or retirees. In Hillsborough County the labor force increased at a faster percentage rate, 6.0% between 1990 and 2001, than in Milford, suggesting a higher growth in labor force participants in the rest of the County. As shown in Table 3, the growth rate in the labor force in the Nashua PMSA at 4.5% was similar to that in Milford, but less than half the growth rate indicated for the State. By comparison the growth rate in the Manchester PMSA was 7.2%, higher than indicated for the Nashua PMSA and Milford, indicating that this area is benefiting from a greater increase in labor force participants.

Table 3: Labor Force Trends

Area	1990	2001	Change	
			#	%
Milford	7,187	7,510	323	4.5%
Hillsborough Co.	200,589	212,660	12,071	6.0%
Nashua PMSA	103,257	107,910	4,653	4.5%
Manchester PMSA	101,997	109,390	7,393	7.2%
State of NH	627,671	685,511	57,840	9.2%

Source: NH Employment Security

Figure 5: The average unemployment rate for the State of New Hampshire declined to a low of 2.7% in 1999, the lowest rate for the State during the past 12 years. Since then the average unemployment rate increased slightly in 2000 to 2.8%, but then in 2001 it took a more significant rise to 3.5%. However, this rate is well below the 7.5% rate experienced in 1992, in the midst of the prior recession. The unemployment rate for Milford is traditionally lower than the State, as evidenced by the 3.3% rate in 2001, and the 2.1% rate in 2000 and 1998. In addition, the rate for Milford is generally lower than the unemployment rate reported for the Manchester or Nashua PMSAs. As illustrated above, the unemployment rate in the Nashua PMSA jumped to 4.2% in 2001, the first time above the 4% level since 1996.



Conclusions: The labor force in Milford has increased at a much slower rate than population growth since 1990. In fact, only 17.5% of the population increases were labor force participants. In addition, the number of employed persons increased as the unemployment rate declined in the latter half of the 1990s. However, a softening in the economy in the early 2000s has resulted in a recent up-tick in the unemployment rate. The unemployment rate in Milford, however, is traditionally lower than other areas, suggesting a more stable labor force.

E. Business and Employment Trends

This section analyzes private sector business and employment trends in the Town of Milford and the region over a twenty-year period between 1980 and 2000.³ The first part discusses growth in the number of businesses, while the second part discusses growth in terms of employment. Business and employment growth in the Town of Milford is compared to changes in Hillsborough County and the State. Additional information about trends by major industry sector is also presented utilizing data for the Nashua Primary Metropolitan Statistical Area (PMSA) and the Manchester PMSA.

³ Business and employment data for this section was obtained from NH Employment Security and is reflective of private sector, non-governmental, businesses that file unemployment compensation reports.

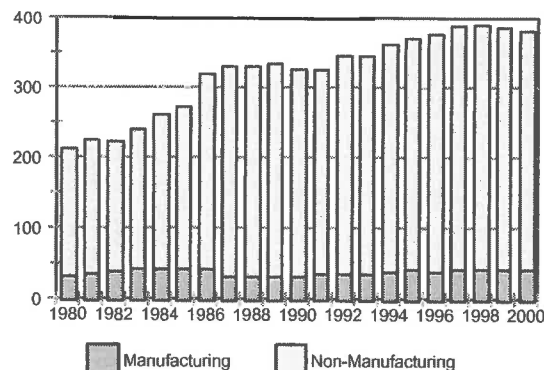
Figure 6: In 1998, Milford had 390 operating businesses, reflecting a gain of 179 firms since 1980, when there were 211 businesses operating in the town. This indicates an 84.8% gain, or an average of more than 4.2% per year. However, the number of businesses declined by 8 firms in the last two years. As noted, the town experienced a higher percentage of growth in new businesses during the 1980s than in the 1990s. The average annual growth rate was 5.8% in the 1980s, but only 1.7% per year in the 1990s. In addition, 93.3% of all new businesses since 1980 are classified as non-manufacturing firms. This trend was similarly observed at the county and state levels.

Figure 7: The number of businesses in Hillsborough County increased by 90.5% between 1980 and 2000, as evidenced by 5,230 new business formations. This growth rate is only slightly higher than indicated in Milford, suggesting that the local economy kept pace. Similarly, the growth rate in Hillsborough County during the 1980s (5.3%) was higher than that experience in the 1990s (2.4%), since in each market there was a lull in new business formation at the end of the 1980s and into the early 1990s. During this twenty-year period, non-manufacturing firms account for nearly 96.0% of business growth, which is slightly higher than indicated locally. The Town of Milford captured 5.7% of the new manufacturing businesses in the County during the twenty years, and only 3.3% of the non-manufacturing growth. These figures are basically equivalent to Milford's share (5.6% and 3.4%) of the market in 2000, indicating that Milford has been able to attract a representative share of the County's growth.

Figure 8: Between 1980 and 2000, the State of New Hampshire has benefited from an increase of 19,030 businesses, rising from 21,060 firms in 1980 to 40,090 businesses in 2000. This indicates a 90.3% growth rate similar to that in Hillsborough County, and the Town of Milford. The growth rate in new businesses averaged

Business Trends by Industry

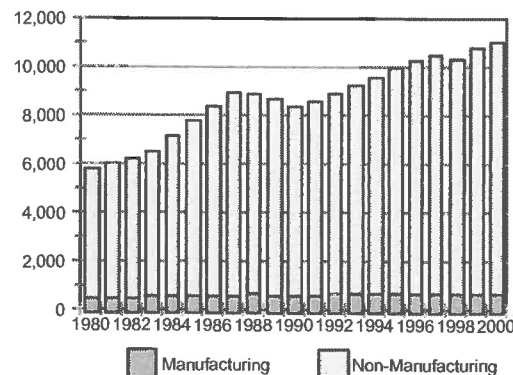
Town of Milford (1980-2000)



Source: NH Employment Security

Business Trends by Industry

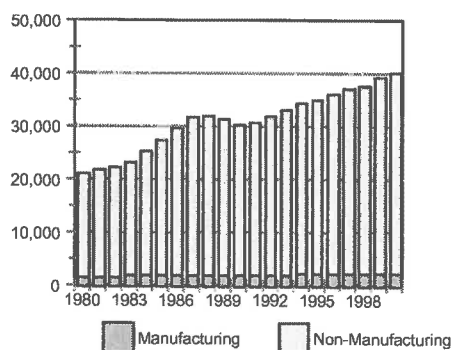
Hillsborough County (1980-2000)



Source: NH Employment Security

Business Trends by Industry

State of NH (1980-2000)

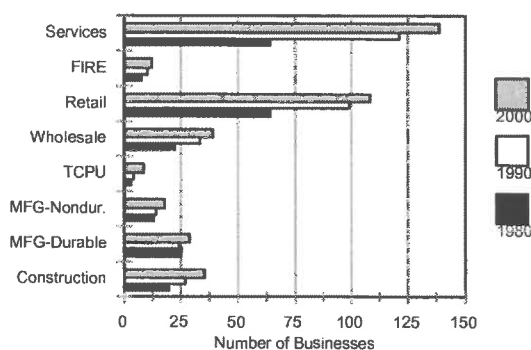


Source: NH Employment Security

5.1% during the 1980s, but declined to 2.6% during the 1990s. Similarly, 96.2% of the new businesses were in non-manufacturing industries.

Figure 9: In Milford, firms in the services industry experienced the most growth between 1980 and 2000, followed by gains in retail businesses. In 2000, firms in these two sectors represent 64% of all businesses operating in Milford. Increases were also experienced in the wholesale trade, manufacturing and construction sectors. In fact, gains were evident in the number of businesses across all industry sectors during the twenty-year period. These increases appear fairly consistent with changes observed in the two surrounding PMSAs.

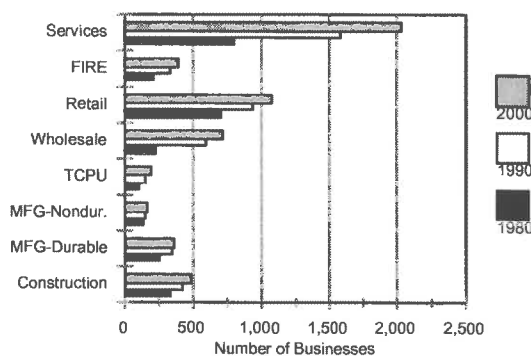
Business Trends by Industry
Milford, NH (1980 - 2000)



Source: NH Employment Security and RKG Associates, Inc.

Figure 10: Firms in the services sector enjoyed the highest gain in the Nashua PMSA between 1980 and 2000. More growth occurred during the 1980s (28%) than in the 1990s (19%). Firms in the trade sector (retail and wholesale) also experienced noticeable growth during these periods, similar to the trend indicated in Milford. Gains in the number of businesses were evident in all industry sectors during the twenty-year period, although only small gains in manufacturing businesses, both durable and non-durable, occurred in the 1990s.

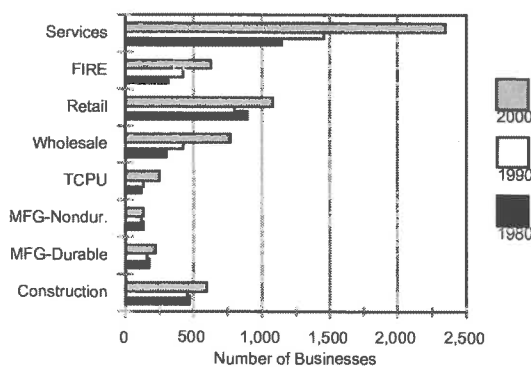
Business Trends by Industry
Nashua PMSA (1980 - 2000)



Source: NH Employment Security

Figure 11: Firms in the services sector also experienced the greatest amount of growth in the Manchester PMSA between 1980 and 2000. Although, more growth occurred in these industries during the 1990s, rather than in the 1980s, countering the trends in the Nashua PMSA. This region also experienced greater growth in businesses in the financial, insurance and real estate (FIRE) sector. Retail businesses declined between 1980 and 1990, but subsequently recovered and experienced gains during the 1990s.

Business Trends by Industry
Manchester PMSA (1980 - 2000)



Source: NH Employment Security

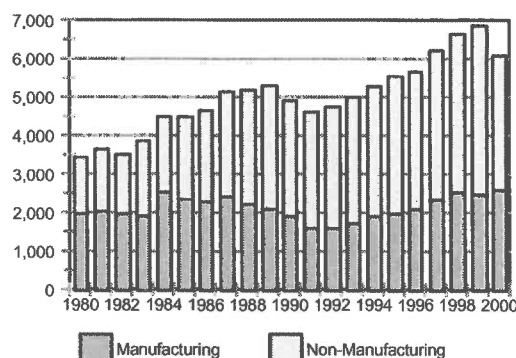
Conclusions: Milford has enjoyed a gain of roughly 170 operating businesses between 1980 and 2000. Nearly 93.6% of this growth occurred in non-manufacturing businesses, with businesses in the services and retail sector experiencing the most growth during the twenty-year period. Some growth, albeit small, did occur in the manufacturing sector, which experienced more growth in businesses during the 1990s than in the 1980s. This latter finding counters the trend in the manufacturing sector in the Nashua PMSA, where nominal growth in manufacturing businesses occurred in the 1990s. In fact, Milford captured nearly 36% of the growth in manufacturing firms in the Nashua PMSA during the 1990s, which is nearly four times its representation (9.3%) in 2000. This is a significant finding in light of the decline in manufacturing employment as discussed below, and beneficial for the planning of a proposed business park. It also suggests that manufacturing businesses are locating in Milford, despite it being somewhat removed from the interstate highway network.

1. Employment Trends

Figure 12: Total employment in the Town of Milford increased by 3,440 jobs (from 3,420 in 1980 to 6,860 in 1999, the peak of the twenty year period) indicating a 100.4% gain. Employment in Milford declined by nearly 800 jobs in 2000, to a level of roughly 6,080 jobs. Between 1980 and 1989, employment rose by nearly 1,870 jobs, representing an annual growth rate of 6.0% during the 1980s. Then, employment levels declined to a low of 4,610 jobs in 1991, and subsequently recovered over the next three year, such that employment in 1994 surpassed the previous high mark in 1989. Over the next five years, employment increased by another 1,590 jobs,

indicating a 6% average growth rate between 1994 and 1999. A decline of -11.5% occurred between 1999 and 2000, such that the average growth rate since 1994 was only 2.5%. Therefore, between 1980 and 2000, private employment in Milford increased by 2,650 jobs, denoting an annual growth rate of 3.9%. More importantly, 21.7% of the jobs were in manufacturing companies, as this sector experienced a gain of 575 positions, or 27.9%, during this twenty-year period. As shown, manufacturing employment reached a peak in 1984 at 2,570 jobs, and then declined to its nadir of 1,660 jobs in 1992. In 1998, manufacturing jobs recovered to its previous benchmark, and by 2000 surpassed that level by only 62 jobs. In other words, the amount of manufacturing jobs in 2000 is only 2.4% higher than the prior peak sixteen years earlier in 1984. In spite of these low trends, Milford experienced a higher growth rate in manufacturing jobs over the last twenty years than Hillsborough County or the State.

Employment Trends by Industry
Town of Milford (1980-2000)



Source: NH Employment Security

Figure 13: Employment in Hillsborough County increased by 60,300 jobs between 1980 and 2000, indicating an annual growth rate of 2.6%. This suggests that Milford has captured a greater percentage of new job growth in the County, than its share of employment. As illustrated, employment in Hillsborough County peaked in 1989, and did not return to that level until 1997. In the three subsequent years, employment grew at an average rate of 1.8% a year. Manufacturing employment increased by 8,280 jobs between 1980 and 1984, when it reached a height of 55,050 jobs. Employment in this sector has subsequently declined. The level of 42,300 jobs in 2000 is roughly 3,680 jobs ahead of the nadir in 1993 at 38,620 jobs. Although this sector has shown some recovery in recent years, the employment level in 2000 remains 9.6% *below* the figure twenty years earlier in 1980, which is the opposite of trends in Milford, but similar to trends indicated throughout the State.

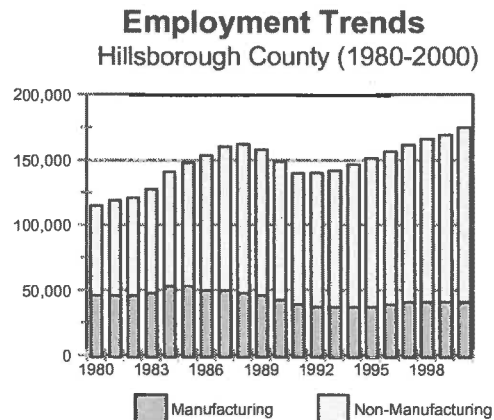


Figure 14: Private employment in the State of New Hampshire has increased by 206,500 jobs in the twenty-year period, from 323,230 in 1980 to 529,730 in 2000. This indicates an average growth rate of 3.2% per year. As exhibited, employment peaked at 455,110 in 1988, whereupon recovery did not occur until some point in 1995. Over the last five years, employment has grown by another 74,600 jobs. Similar to trends in Hillsborough County, manufacturing employment in 2000 is 8.8% *lower* than it was in 1980. In 2000, only 20% of the state's employment base was manufacturing, reflecting a transition from 1980 when 36.1% was employed in manufacturing. By comparison, 60.0% of the 1980 employment base in Milford was manufacturing, which subsequently declined to 43.3% of the 2000 employment base.

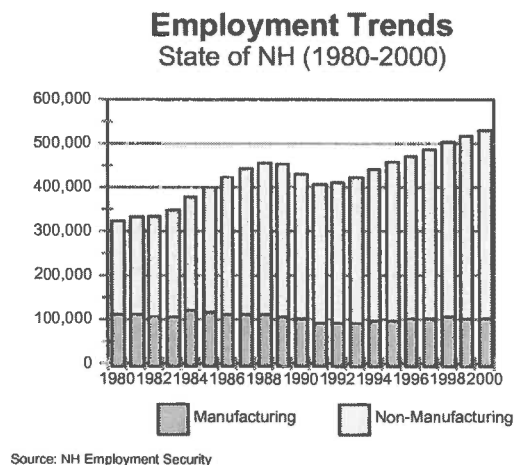
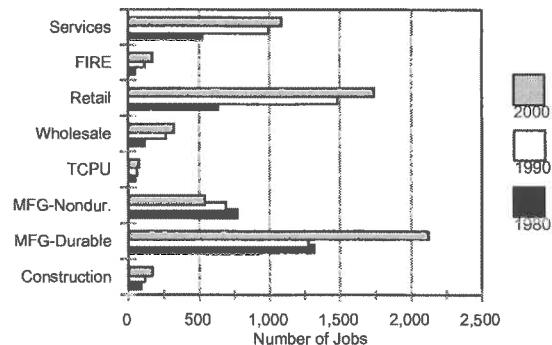


Figure 15: Between 1980 and 2000 employment in the retail sector in Milford experienced the most growth as evidenced by an increase of more than 1,100 jobs during the 20-year period. As illustrated, only 23.3% of this growth in retail employment occurred in the 1990s, similar to trends in the services sector. In comparison, employment in the manufacturing-durable goods sector experienced a gain of roughly 800 jobs during the twenty-year period, and all of it occurred in the 1990s. Employment gains were also evident in the FIRE, TCPU, wholesale trade and construction sectors. In total, jobs increased by nearly 430, offsetting losses in the non-durable manufacturing goods sector.

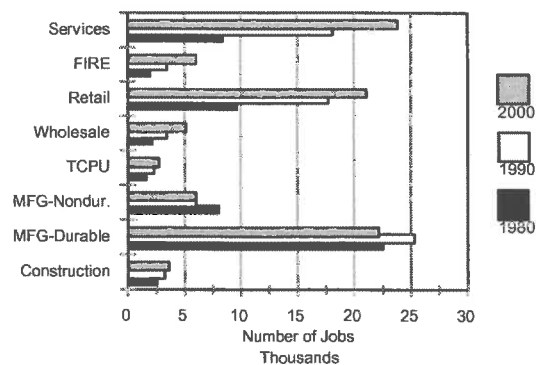
Employment Trends by Industry
Milford, NH (1980 - 2000)



Source: NH Employment Security and RKG Associates, Inc.

Figure 16: Employment in the services and retail sectors increased by nearly 27,000 jobs in the Nashua PMSA between 1980 and 2000. This represents 79.5% of total job growth during this twenty-year period. Employment in the FIRE sector increased by nearly 3,900 jobs, and much of this gain occurring in the 1990s, when Fidelity Investment established a new business campus in Merrimack. Offsetting these gains were declines in manufacturing employment. In fact, there were more than 2,300 fewer jobs in manufacturing in 2000 than in 1980, despite an increase of 575 manufacturing jobs in Milford.

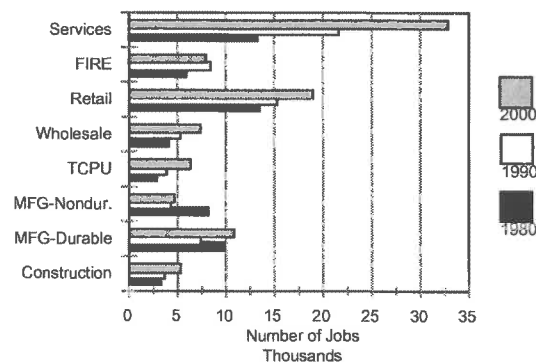
Employment Trends by Industry
Nashua PMSA (1980 - 2000)



Source: NH Employment Security

Figure 17: A similar trend occurred in the Manchester PMSA, as manufacturing employment in 2000 decreased by 2,400 jobs from 1980. A positive note was that all the declined occurred in the non-durable goods sector, since employment in durable goods increased by more than 1,100 jobs during the twenty-year period. A similar trend occurred in Milford. As evident in other regions, employment in the services sector experienced the most gain, followed by growth in retail, which combined accounted for 50.7% of total employment growth during the twenty-year period.

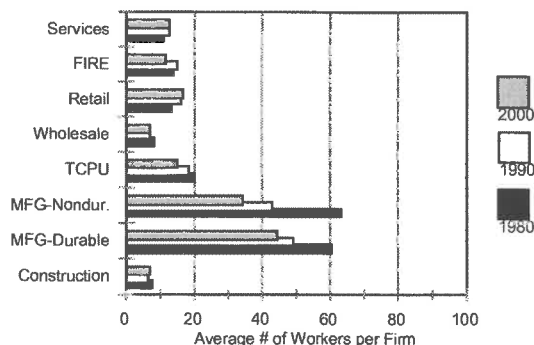
Employment Trends by Industry
Manchester PMSA (1980 - 2000)



Source: NH Employment Security

Figure 18: While Milford enjoyed both new business and employment growth during the last twenty years, the average number of workers per firm (business) declined in nearly all industry sectors. As illustrated, the average employment at firms in the non-durable goods sector was smaller in 2000 than in 1980, dropping from roughly 62 jobs per firm to nearly 34 jobs per firm in 2000. Also, average employment at firms in the durable goods sector declined from nearly 60 in 1980 to an average of 44 in 2000. The average employment per firm in the other industries was below 16 persons per firm, ranging from a high of 16 in the TCPU sector, to a low of nearly 7 in the construction industry.

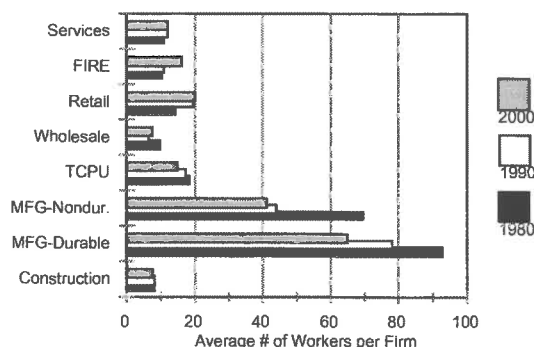
Employees by Firms by Industry
Milford, NH (1980 - 2000)



Source: NH Employment Security and RKG Associates, Inc.

Figure 19: A similar decline in the average number of workers per manufacturing firm, both durable and non-durable, occurred in the Nashua PMSA, although, the average number of employees per firm remains higher than Milford. In comparison, the average number of workers in the other sectors is below 20, similar to numbers in Milford.

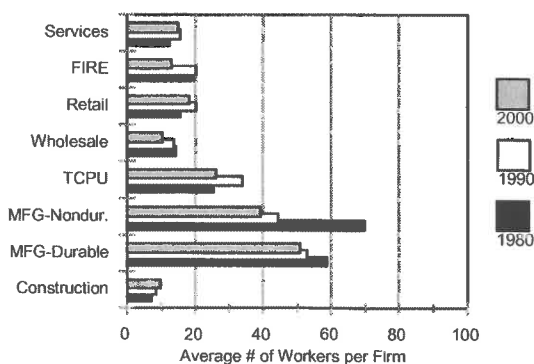
Employees by Firms by Industry
Nashua PMSA, NH (1980 - 2000)



Source: NH Employment Security and RKG Associates, Inc.

Figure 20: A similar trend in the average number of workers per business was also evident in the Manchester PMSA. However, the average employment at manufacturing firms is more similar to that in Milford, than what was evident in the Nashua PMSA. In addition, the average firm size in the other industry sectors was below 20 jobs per firm, except in the TCPU sector.

Employees by Firms by Industry
Manchester PMSA, NH (1980 - 2000)



Source: NH Employment Security and RKG Associates, Inc.

Conclusions: In 2000, employment in Milford remained about 800 jobs below the previous high benchmark of nearly 6,900 jobs established in 1999. In the twenty-year period between 1980 and 2000, Milford has experienced an increase of roughly 2,650 jobs, or a 77.3% gain in its employment base. This suggests an average growth rate of 3.9% per year during this time frame. However, more job growth occurred during the 1980s than in the 1990s. Unlike the trends in the Nashua PMSA, Milford has enjoyed an increase in its manufacturing base, which accounted for 43.3% of total employment in Milford for 2000. This suggests that the local area has been able to retain and/or attract a higher percentage of manufacturers than the region as a whole. Employment in the services and retail sectors have also enjoyed gains, as well as all the other major industrial sectors. Historical trends also indicated that the average number of workers per firm has been declining over the last twenty years, which, from a real estate perspective, suggests less building space and land areas will be needed to support new and existing businesses.

2. Expanding Firms in the Nashua and Manchester PMSA

Table 4 contains a list of selected major businesses that expanded in 2000, according to data contained in the Economic Review of NH prepared by the Public Service Company of New Hampshire (PSNH). As noted in Table 4, over 1,700 jobs were created by the expansion of seven major companies in the Nashua PMSA, including 60 jobs in Milford. The latter was attributed to the expansion of Hitachi Corporations at the Milford Technology Park, the former home of Data Products in the 1980s, and more recently PC Connection in the mid-to-late 1990s. However, this company (PC Connection) subsequently relocated to a vacant shopping center on Route 101A in Merrimack, a few miles from Milford. Not included on the list is the 335,000 SF building that was constructed in Nashua for Corning Lasertron, which then reversed its decision about occupying the building. The building now sits vacant awaiting occupancy, and represents 11.0% of the available industrial building supply in the region. More discussion on building availabilities, such as the Milford Technology Center and the Corning property are presented later in this report.

Table 4: New and Expanding Firms in The Nashua & Manchester PMSA in 2000

<u>Nashua PMSA</u>	<u>Town</u>	<u>Bldg. SF</u>	<u>Exp. Jobs</u>	<u>Business Product</u>	<u>Status</u>
Delta Education	Nashua	87,000	20	Education Kits	Exist
Ellacoya Networks	Merrimack	50,000	100	Software	Exist
Fidelity Investments	Merrimack	250,000	1,200	Investment Services	Exist
Hitachi Corp.	Milford	60,000	60	Electronics	Exist
Sun Microsystems	Nashua	48,000	20	Software	New
Teradyne	<u>Nashua</u>	<u>190,000</u>	<u>300</u>	Connection Systems	Exist
	Subtotal	685,000	1,700		
<u>Manchester PMSA</u>					
CTS Corporation	Londonderry	84,000	30		Exist
Motek Motion Tech.	Manchester	9,700	30	Motion Pictures	New
Space Disc	<u>Auburn</u>	<u>10,000</u>	<u>30</u>	Software/Networking	New
	Subtotal	103,700	90		

Source: PSNH Economic Review of NH

3. Major Industries and Firms in Milford

Listed in Table 5 are some of Milford's major employers in 2000, according to community profile data from New Hampshire Employment Security. These nine businesses, including Hitachi Corporation as noted in Table 4, employ 1,575 workers, representing 25.9% of the town's employment base in 2000.

Table 5: Major Employers in Milford

Company Name	Product/Service	Employees	Year Est.
Hitchiner Manufacturing	Ferrous, non-ferrous castings	750	1946
Hendrix Wire & Cable	High voltage power cables	180	1957
Norton Company	Industrial ceramics	160	1978
Gar-Doc	Pressure sensitive labels	90	
Lucas Grason-Staedler, Inc.	Audiometers	89	1983
Permotech Diamond Tool Corp.	Industrial diamond tools	86	1954
Airmar Technology Corp.	Ultrasonic transducers	80	1981
NPC, Inc.	Diamond tools & coring	80	1972

Source: 2000 SOICC of NH

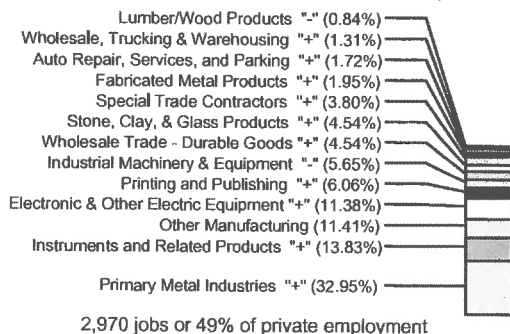
4. Milford Employment Base by Property Type

This section correlates employment in the Town of Milford for 2000 by specific industry sectors, with different building types. Also identified are those indigenous sectors that are forecasted to experience employment growth (+) or losses (-) over the next five years, according to statewide projections prepared by NH Employment Security.

Building Type	Industry Sectors
Industrial	Construction; manufacturing; transportation, communication and utilities (TCPU); wholesale trade; and auto repair services.
Office	Financial, insurance and real estate (FIRE); and services
Retail	Retail

Figure 21: Roughly 49% of Milford's employment base in 2000 was in businesses that utilize industrial-type buildings. Employment in primary metal industries accounted for nearly 31% of these jobs followed by jobs in the instrument and related products, other manufactures, and electronic equipment sectors. Printing and publishing jobs, and industrial machinery jobs accounted for another 6%, each, followed by jobs in the industrial machinery and equipment sector, wholesale trade sector, and the stone, clay and glass products sector. As exhibited, ten sectors of the twelve are forecasted to experience growth in the short term.

Industrial-Type Employment Base Town of Milford, NH (2000)

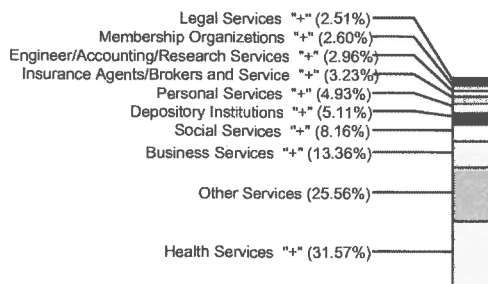


Source: NH Employment Security

"+" industry is forecasted to experience job gains to 2008
 "-" industry is forecasted to suffer employment decline

Figure 22: Employment in office type buildings accounted for 18% of the employment base in Milford for 2000. Health services was the leading sector for this type of building area, followed by employment in other services, business services, and social services. Financial services such as banks (depository institutions), personal services and insurance services represented 3% to 5% of the base, followed by engineering and legal services. All of the industry groups exhibited are forecasted to experience job gains in the short term.

Office-Type Employment Base Town of Milford, NH (2000)



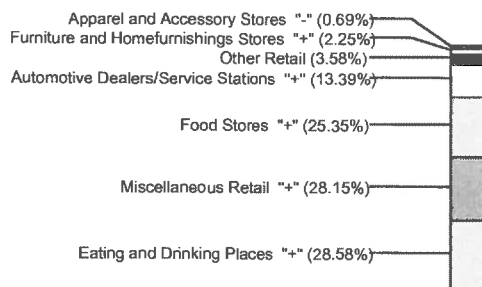
1,115 jobs or 18% of private employment

Source: NH Employment Security

"+" industry is forecasted to experience job gains to 2008
 "-" industry is forecasted to suffer employment decline

Figure 23: Employment in retail or commercial type buildings accounted for 28% of Milford employment in 2000. Restaurants, miscellaneous or niche stores, food stores, and auto dealer have the highest concentration of employment. Each of these industry sectors are anticipated to experience employment growth for the short term, with the exception of apparel and accessory stores.

Retail-Type Employment Base Town of Milford, NH (2000)



1,732 jobs or 28% of private employment

Source: NH Employment Security

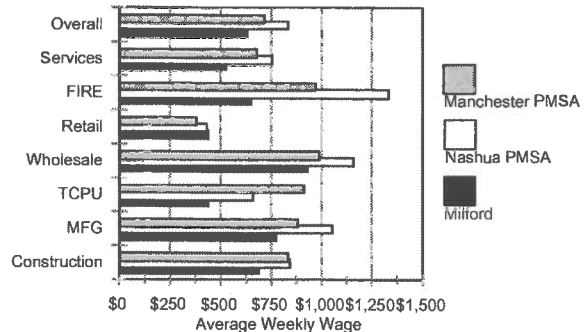
"+" industry is forecasted to experience job gains to 2008
 "-" industry is forecasted to suffer employment decline

Conclusions: Milford has a strong and diversified employment base and nearly all the indigenous industries are in those sectors that are forecasted to experience job growth over the short term. Nearly 50% of the Milford's employment base utilizes industrial type properties, while another 28% occupy retail type buildings and another 18% of the base is services oriented and would utilize office type buildings. Future employment demand would be more oriented to office or "flexible" space (a hybrid of office and industrial), since 62.5% of the job growth is forecasted in services oriented business, and the remaining 38% fairly evenly divided between industrial and retail type employment.

5. Average Wage and Real Estate Tax Comparison

Figure 24: The 2000 average wage (\$618) in Milford was 24.7% lower than that in the Nashua PMSA, and 13.1% lower than in the Manchester MSA. As exhibited, the highest average wage in Milford was in the wholesale trade sector (\$921) and the lowest was in the retail sector (\$428). All of Milford's industries had a lower average wage in comparison to the Nashua and Manchester PMSAs, with the exception of retail. In addition, average wages in Milford were closer to those in Manchester than in Nashua. This can be considered a positive attribute for attracting new businesses.

Average Weekly Wages by Industry
Milford and Central NH (2000)



Source: NH Employment Security

The following table lists the 2000 and 2001 tax rate, for comparison purposes, of the Town of Milford and some of the major competing communities in the region. Also presented is the full value, or equalized tax rate, for 2000. As exhibited, Milford had the highest "full value" real estate tax rate (\$24.28) in the region in 2000, as well as the highest ranking. Auburn and Bedford had the lowest ranking with rates of \$15.05 and \$16.50, respectively, indicating that real estate taxes in Milford were as much as 60% higher than some of the other communities. The local rate in Milford's for 2001 is 4.6% higher than in 2000, suggesting that Milford remains at a competitive disadvantage in relation to some neighboring communities.

Table 6: Tax Rate Comparison of Milford, NH and Selected Communities in the Nashua and Manchester PMSAs

Community	Actual 2000	Full Value 2000	Rank*	Actual 2001
Milford	\$26.50	\$24.28	181	\$27.72
Manchester [2]	\$30.68	\$22.70	158	\$23.82
Londonderry [2]	\$26.27	\$22.30	151	\$24.67
Amherst [1]	\$27.78	\$21.99	141	\$29.15
Litchfield [1]	\$22.58	\$21.58	137	\$23.32
Wilton [1]	\$44.00	\$20.08	111	\$45.00
Merrimack [1]	\$21.45	\$19.94	109	\$21.30
Nashua [1]	\$21.35	\$19.90	106	\$22.50
Hooksett [2]	\$21.23	\$18.76	84	\$25.27
Hudson [1]	\$23.04	\$17.93	76	\$25.41
Bedford [2]	\$18.30	\$16.50	52	\$19.11
Auburn [2]	\$21.33	\$15.05	37	\$24.04

* Ranking in NH based on the lowest (1) to highest (230) full value tax rate

[1] in the Nashua PMSA

[2] in the Manchester PMSA

Source: NH Department of Revenue

F. Local and Regional Real Estate Supply

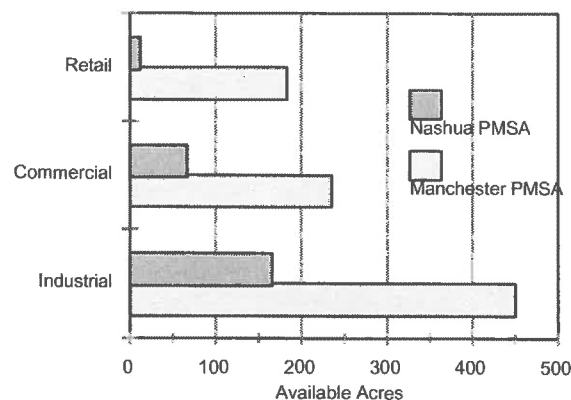
In this section the supply of available real estate, both land and buildings, in the region is identified. The region for this analysis consisted of the various communities in the Nashua and Manchester PMSAs.

1. Current Availability of Land in the Region

A supply of roughly 1,600 acres for non-residential uses was identified as available to the market in the central southern region of New Hampshire.⁴ From this supply, over 460 acres were eliminated since municipal water and/or sewer were lacking. Notably, two industrial parks in Amherst, owned by Tamposi-Nash, were excluded from this analysis since these roughly 340 acres lack municipal sewer.

Figure 25: A supply of more than 1,115 acres of fully serviced land is available in the central southern New Hampshire region. This includes nearly 600 acres for future industrial development, 320 acres for commercial development and 195 acres for retail development. As exhibited the Manchester PMSA has roughly 77.2% of this supply, with the remaining land in communities located in the Nashua PMSA. As discussed below Milford has approximately 16 acres of available land, representing only 1.5% of this supply.

Available Fully-Serviced Land
Central Southern New Hampshire



Industrial Land: The region has nearly 600 acres available for future industrial use, including two vacant lots in Milford having 11 acres.⁵ As shown in Table 7, Londonderry has nearly 185 acres of industrial land. Most of this land is at the Eco Park, which is currently being developed, and the Regional Air Industrial Park. Hooksett has nearly 170 acres available for future industrial development and Manchester has roughly 100 acres. In the Nashua PMSA, Merrimack has nearly 90 acres available for future industrial development, including 60 acres at the Mast Road Industrial Park. Wilton has 52 acres at a newly prepared park on Route 101, referred to as Wilton Woods.

⁴ RKG contacted local brokers and searched various internet listing services for commercial real estate (land and buildings) including loop.net, the NHEDDS Real Estate Database, and NH.commercialsearch.com. This listing data was further refined to different towns in the region and by use, industrial, commercial and retail. Uses can vary between communities because of local zoning. For instance, industrial land in business parks is also available for office uses, and office land on commercial corridors is also available for retail use. In addition, the sample does not represent all undeveloped land areas in the region, but just those available to the market in late 2001 or early 2002. Some of the notable exceptions include 150 or so acres owned by Flatley Company in Nashua; the 140-acre former UNH campus at Hackett Hill in Manchester, which the City recently acquired and is planning an office/R & D campus with over 1.2 million SF of multi-story buildings; and the 100 or so acres at Exit 10 of I-93 in Hooksett where a major retail center is planned. Also, the project site of 80 or so acres is not included.

⁵ A 4-acre site on Phalen Road; and a 7-acre site on Perry Road near the entrance to the project site.

Industrial land pricing ranges from less than \$10,000 per acre to \$125,000 per acre. Various factors can influence values such as location, utilities, parcel size, future site development and costs. For instance, a 52-acre parcel available off Independence Road in Londonderry has an asking price of \$400,000 or \$7,700 per acre. The development potential, however, is limited to the front 8 to 10 acres, because fill and infrastructure will be required to access the back portion of the site. Effectively, the price is \$40,000 to \$50,000 per acre for the useable portion of the site. Other sites at the Regional Air Industrial Park in Londonderry range from \$60,000 to \$85,000 per acre, although one site has an asking price of \$125,000 per acres. In Milford the asking price for a two acre lot is around \$150,000, indicating a value of \$75,000 per acre. This value is at the low end of the range in Merrimack where pricing typically varies from \$75,000 to \$100,000 per acre. Some sites, including Tamposi-Nash offerings, are available for land lease only, at a rate equivalent to \$85,000 per acre.

Office/Commercial Land: There is roughly 325 acres available for future office or commercial development in the region, including 3 acres in Milford, representing 1.0% of the supply. Hooksett and Londonderry have more than 70 acres each for this type of development, while Bedford has 53 acres and Manchester has 31 acres. Nearly all the Bedford land is in the performance zone where a variety of commercial uses are permitted. In Wilton, roughly 8 acres are available which consists of the commercially zoned, frontage portion of the Wilton Woods Park.

Table 7: Available Non-Residential Land By Use and Community

City/Town	Industrial	Commercial	Retail	Total	% of total
Bedford		53		53	4.7%
Hooksett	166	76	75	317	28.4%
Londonderry	184	72	89	345	30.9%
Manchester	97	31	18	146	13.1%
Amherst		19		19	1.7%
Merrimack	85	21	4	110	9.9%
Milford	11	3	2	16	1.5%
Nashua	3	40	7	50	4.5%
Wilton	52	8		60	5.4%
Total	598	323	195	1,116	100.0%
% of total	53.6%	29.0%	17.5%	100.0%	

Source: RKG Associates, Inc.

In the Nashua PMSA there are 40 acres available in the City of Nashua at the Southwood Corporate Park, adjacent to Exit 8, off the Everett Highway. Merrimack has 21 acres at the Merrimack Executive Park, where three office buildings that would contain 156,000 SF are proposed. This project is in close proximity to Exit 11 off the Everett Turnpike. Pricing for this type of land use ranges from \$25,000 to more than \$200,000 per acre, depending on utilities, location, site costs, excess land, etc.

Retail Land: There is roughly 190 acres for retail development in the region, representing 17.8% of the supply. Londonderry has roughly 90 acres for this use, followed by Hooksett with 75 acres, and Manchester with 18 acres. These three communities in the Manchester PMSA have 95.3% of the available supply, with the remainder limited to scattered sites in a few communities

located in the Nashua PMSA. Land pricing for retail parcels range from less than \$100,000 to more than \$500,000 per acre, depending on location, size, traffic counts and visibility, utilities, site costs, etc.

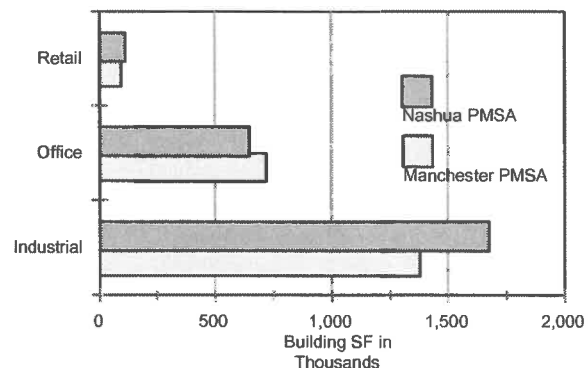
Conclusions: Although the region has a relatively large supply of industrial land (600 acres), most of it is concentrated in the Manchester PMSA, notably in Londonderry. The majority of available industrial land in the Nashua PMSA is either in Merrimack or Wilton. Nashua and Merrimack have roughly 60 acres in close proximity to the Everett Turnpike for future office development. In addition, Bedford has another 50 acres for this type of development. Clearly, Milford lacks a sufficient supply of available industrial or commercial land to support significant economic expansion for the long term.

2. Current Availability of Buildings in the Region

A supply of roughly 4.6 million SF of commercial and industrial building space was found available to the market in the central southern region of New Hampshire. Approximately two-thirds of this supply is industrial space, as evidenced by the availability of 3.0 million SF. Another 29.4%, or 1.3 million SF is office or commercial space, and the remaining 4.1%, 0.2 million SF, is retail space.

Figure 26: Roughly 52.5% of the 4.6 million SF is located in communities within the Nashua PMSA, while the remaining 47.5% is in the Manchester PMSA. Of the 3.04 million SF of industrial space, more than 1.66 million SF is located within the Nashua PMSA, and 1.38 million SF is located within the Manchester PMSA. Nashua has 0.64 million SF of the available office space, and Manchester has roughly 0.71 million SF. In terms of retail space, roughly 0.19 million SF is available, which is fairly evenly distributed between the two markets.

Available Buildings By Use
Central Southern NH (March, 2002)



Source: RKG Associates, Inc.

Industrial Buildings: The City of Nashua has the largest supply of industrial buildings with nearly 1.0 million SF available. Nearly one-third of this supply is contained in the newly built Corning Lasertron property of 335,000 SF on a 55-acre parcel at the Westwood Industrial Park. The City of Manchester has 0.9 million SF of available industrial space, which is 67.1% of the supply within this region. However, nearly 35.8% of this space is contained in multi-level mill buildings, which provides low cost alternatives to many users, including start-up business. Londonderry has more than 0.40 million SF of industrial space available, followed by Hudson with 0.37 million. Milford has 0.19 million SF available and nearly all of it is located at the Milford Technology Center, including a proposed expansion of 0.12 million SF. Another 23,000 SF of industrial-flexible space is offered at the Pine Valley Mill in Milford on Old Wilton Road.

Rental pricing for industrial buildings ranges from a low of around \$4/SF to a high of \$8/SF.

Location, age, size of unit, utilities, level of finish, etc. all influence value. More modern properties range between \$5.50/SF and \$7.50/SF, while the older properties are at the lower end of the range. Pricing in the Milford market is reportedly on the lower end range from \$4/SF to \$6/SF.

Office Buildings: The City of Manchester has 0.55 million SF of office space available, while the City of Nashua has 0.40 million SF, reflective of 40.8% and 29.6% of the 1.34 million SF of available office space, respectively. Merrimack has 0.14 million SF available, while Bedford has 0.73 million SF and Amherst 0.71 million SF. Milford has only 12,000 SF of office space available, representing 0.9% of the regional supply.

Rental pricing for office spaces range from less than \$8/SF to more than \$20/SF, depending on location, age, condition, utilities included, amenities, etc. Office rents at some of the better quality properties, along the Amherst Street Corridor in Nashua, generally rent at the high end of the range, while rents at older, less modern properties in downtown areas rent at the lower end of the range.

Retail Buildings: A supply of 0.19 million SF of retail space is available in the region, including 0.05 million SF in Milford reflecting 29.1% of the regional supply. Included in this group is a former food store of 20,000 SF at the Granite Plaza on Elm Street, as well as a scattering of other units along Route 101-A and in the downtown. Another 0.6 million SF of retail space is available in Manchester, with the remainder scattered throughout various communities in the PMSAs, as shown in Table 8. Rents for retail space generally run from \$8/SF to \$15/SF, depending on location, condition, age, etc.

Table 8: Available Non-Residential Buildings By Use and Community

	Industrial		Office		Retail		Total	
	#	Bldg SF	#	Bldg SF	#	Bldg SF	Bldg SF	% of total
Auburn			2	25,000			25,000	0.5%
Bedford	2	10,600	17	73,919	2	5,335	89,854	2.0%
Goffstown	3	11,523					11,523	0.3%
Hooksett	3	27,442	2	19,762	2	12,000	59,204	1.3%
Londonderry	9	403,048	10	39,313	4	14,949	457,310	10.0%
Manchester	40	924,533	31	547,738	7	56,556	1,528,827	33.4%
Amherst	1	12,750	12	71,250			84,000	1.8%
Brookline	1	4,312					4,312	0.1%
Hollis					1	9,958	9,958	0.2%
Hudson	6	367,300	4	16,430	3	13,738	397,468	8.7%
Merrimack	3	89,572	14	140,634	2	3,520	233,726	5.1%
Milford	4	194,710	2	12,000	3	54,673	261,383	5.7%
Nashua	14	996,039	34	396,951	3	16,900	1,409,890	30.8%
Total	86	3,041,829	128	1,342,997	27	187,629	4,572,455	100.0%
% of total		66.5%		29.4%		4.1%	100.0%	

Source: RKG Associates, Inc.

Conclusions: Of the 4.57 million SF in the region, Milford has less than 6% of the supply, and most of it is for industrial/flex space type of uses and contained primarily at one project, the Milford Technology Center. Also, 60% of this offering (120,000 SF) is proposed and not yet constructed, reducing the actual supply to roughly 75,000 SF. This finding suggests Milford has a tight supply of available industrial space in comparison to the amount available in the region. The amount of office space available in Milford also appears limited in comparison to the regional supply. While the amount of space in the region seems sizable, discussions with brokers suggest commercial vacancy remains in the 10% to 15% range, while industrial vacancy ranges from 6% to 10%. This suggests only a softening in the market rather than an oversupply, which was evident during the prior recession in the early 1990s. Reportedly, rents have remained stable over the last few years, supporting the finding of a softening. Typically relocation to existing building will be the first choice of expanding businesses, suggesting that a one to three year period may exist in order to reduce the available building supply. The exceptions to this are potential end-users, whose actions are difficult to quantify.

G. Development Implications

The purpose of this section is to allocate historic employment trends in the different industry sectors into potential future demand for commercial and industrial development activity. Utilizing job growth over the last twenty years, the need for additional building space and thus land absorption can be estimated. Tabulated below is a summary of job growth in Milford and the region by different building types. This job growth based on employment factors developed by the Urban Land Institute can in turn be utilized as a measure of annual building and land absorption.

Table 9:
Job Growth Allocated to Building Types (1980-2000)

Market	Industrial	Office	Retail	Total
Milford	856	680	1,115	2,651
Nashua PMSA [1]	1,788	18,700	10,377	30,865
Manchester PMSA	6,552	21,571	5,366	33,489
Total	9,196	40,951	16,858	67,005

[1] Excludes Milford

Source: RKG Associates, Inc.

Industrial Sector: Milford experienced an increase of 850 jobs over the last twenty years in businesses that utilize industrial type buildings. This equates to an annual average of roughly 40 jobs per year. Based on a factor of between 700 and 1,000 SF of space per employee this equates to an average demand of between 30,000 SF to 43,000 SF.⁶ This historic employment trend equates to roughly 2 to 4 acres per year in Milford that would be required to support future job growth in businesses requiring industrial type buildings. The communities in the rest of the

⁶ By accounting for the amount of building that would be re-occupied within the existing building supply, a determination of potential new building area can be estimated, which in turn can be correlated with the amount of land needed to support the new building area.

Nashua PMSA are estimated to have annual absorption rates of 6 to 12 acres per year for industrial type buildings, while the communities in the Manchester PMSA are projected to experience a demand that ranges from 14 to 30 acres per year.

**Table 10: Annual Average Industrial Building and Land Demand
in South Central NH (1980-2000)**

Market	Ann. Job Growth [2]	Bldg SF (000) [3]		New Bldg SF (000) [4]		Land Absorption [5]	
		Low	High	Low	High	Low	High
Milford	43	29.95	42.79	11.98	17.11	2	4
Nashua PMSA [1]	89	62.59	89.41	37.55	53.65	6	12
Manchester PMSA	328	229.32	327.60	91.73	131.04	14	30
Total	460	321.86	459.80	141.26	201.80	22	46

[1] Excludes Milford

[2] Annual average over 20 years between 1980-2000 in construction, manufacturing, TCPU & wholesale trade

[3] Based on factors between 700 and 1,000 SF per employee

[4] 40% estimated at new buildings in Milford; 60% in Nashua and 40% in Manchester

[5] Low end based on a floor area ratio of 15%; high end at 10%

Source: RKG Associates, Inc.

Office Sector: In Milford, job growth between 1980 and 2000 for businesses utilizing office buildings has increase at an average rate of 34 employees per year. This equates to between 10,000 and 17,000 SF of re-occupied office buildings. This in turn equates to about one (1) acre per year which will be required to support this type of use.

**Table 11: Annual Average Office Building and Land Demand
in South Central NH (1980-2000)**

Market	Ann. Job Growth [2]	Bldg SF (000) [3]		New Bldg SF (000) [4]		Land Absorption [5]	
		Low	High	Low	High	Low	High
Milford	34	10.20	17.00	5.10	8.50	1	1
Nashua PMSA [1]	935	280.50	467.50	70.12	116.87	8	18
Manchester PMSA	1,079	323.57	539.28	80.89	134.82	9	21
Total	2,048	614.27	1,023.77	156.12	260.19	18	40

[1] Excludes Milford

[2] Annual average over 20 years between 1980-2000 in FIRE and services sectors

[3] Based on factors between 300 and 500 SF per employee

[4] 50% estimated at new buildings in Milford; 25% in Nashua and Manchester

[5] Low end based on a floor area ratio of 20%; high end at 15%

Source: RKG Associates, Inc.

As exhibited in the previous table, the rest of the communities in the Nashua PMSA are estimated to need between 8 and 18 acres per year to support this demand, while 9 to 21 acres are needed in the communities located in the Manchester PMSA.

Retail Sector: Job growth in the retail sector has averaged roughly 56 new jobs per year between 1980 and 2000 in Milford. This equates to approximately 2 to 3 acres per year needed to support this employment growth, based on the assumptions presented in the following table. Employment trends in the other communities in the Nashua PMSA suggests absorption of between 8 and 15 acres are needed to support this type of employment growth, while 7 to 13 acres would be needed in all the communities in the Manchester PMSA.

Table 12: Annual Average Retail Building Demand in South Central NH (1980-2000)

Market	Ann. Job Growth [2]	Bldg SF (000) [3]		New Bldg SF (000) [4]		Land Absorption [5]	
		Low	High	Low	High	Low	High
Milford	56	25.09	36.24	12.54	18.12	1	3
Nashua PMSA [1]	519	233.48	337.25	70.04	101.18	8	15
Manchester PMSA	268	120.74	174.40	60.37	87.20	7	13
Total	843	379.31	547.89	142.96	206.49	16	32

[1] Excludes Milford

[2] Annual average over 20 years between 1980-2000 in retail sector

[3] Based on factors between 450 and 650 SF per employee

[4] 50% estimated at new buildings in Milford; 30% in Nashua and 50% in Manchester

[5] Low end based on a floor area ratio of 20%; high end at 15%

Source: RKG Associates, Inc.

Absorption Patterns

Comparing the preceding demand analysis, based on historic employment trends, with the current supply of available sites provides an indication of a potential absorption period, or the number of years it would take for the existing supply to be developed. The following table compares the existing land supply with estimated demand indicators.

Table 13: Available Land Supply (March, 2002) [2]

	Industrial	Office	Retail	Total
Milford	11	3	2	16
Nashua PMSA [1]	140	88	11	239
Manchester PMSA	447	232	182	861
Total	598	323	195	1,116

Annual Absorption Patterns

Market	Industrial		Office		Retail		Total	
	Low	High	Low	High	Low	High	Low	High
Milford	2	4	1	1	1	3	4	8
Nashua PMSA [1]	6	12	8	18	8	15	22	46
Manchester PMSA	14	30	9	21	7	13	30	64
Total	22	46	18	40	16	32	56	118

Land Supply in Years

Market	Industrial		Office		Retail		Total	
	Low	High	Low	High	Low	High	Low	High
Milford	3	6	2	5	1	1	2	4
Nashua PMSA [1]	11	24	5	11	1	1	5	11
Manchester PMSA	15	32	11	25	14	26	13	28

[1] Excludes Milford

[2] From a sample of for-sale parcels EXCLUDES the project site in Milford

Source: RKG Associates, Inc.

It is estimated that Milford has a 3 to 6-year supply of industrial land, a 2 to 5-year supply of office land, and only a 1-year supply of retail land. In total, currently available land in Milford for non-residential purposes represents about a 2 to 4-year supply. By comparison, the rest of the

communities in the Nashua PMSA have an estimated five to eleven-year supply in total, whereas the supply in Manchester PMSA equates to a 13 to 28-year inventory.

Conclusions: The 80± acres at the project area, if included, would increase the regional land inventory to nearly 1,200 acres, and would represent 6.8% of that supply. This amount of land suggests a fairly competitive supply in the region that will take many years to absorb, which could be prolonged by any economic softening or oversupply of commercial/industrial buildings. In Milford, the 80 acres at the project area when added to the current supply indicates roughly 100 acres available locally, and the project area would represent approximately 80% of this available non-residential land supply.

H. Conclusions and Recommendations

Commercial and industrial market conditions in central southern New Hampshire have primarily been very positive over the last five to ten years and the Town of Milford has benefited from a steady demand for this type of land and buildings. It is likely, however, that any proposed non-residential uses for the project site would be considered highly speculative in today's financial market, especially considering the economic softening that started in 2000, and was further hampered by the tragic events on September 11, 2001. In addition, any proposal at the project site would compete with another 1,100 acres of land already on the market in the region as well as an inventory of 4.6 million SF of available building space.

In light of these conditions, however, Milford has a relatively short supply of ready-to-go industrial sites with all utilities, such that the opportunity to make the project site market ready appears strong. Realistically, the absorption of the 80+/- acres could take between 15 and 50 years to achieve full build-out, depending on a number of factors including future economic cycles, availability of utilities, zoning, pricing, development standards, and future marketing approaches.

Obviously several development related options might be considered for the project that could improve market acceptance, as well as impact its feasibility. Several points to consider, which would likely accelerate potential absorption, are presented below:

- Municipal water and sewer: Modern industrial and commercial users prefer sites with a full range of utilities, so that future users don't have to deal with costly septic systems and on-site water systems. Building safety codes in many cases require internal sprinklers for fire suppression, which can be costly if municipal water is not provided. In addition, insurance companies typically provide better rating for buildings with fire suppression systems.
- Revising zoning: Currently, office use in the industrial zone is only permitted on a stand-alone basis when a building of 15,000 SF building or larger is constructed. Large-scale office use at this location, however, does not appear viable for the site under current market conditions. Reducing the requirement to say a 5,000 SF minimum would permit small end-user companies to consider the site as an option. Retail use, which is also not permitted by zoning, does not appear viable at this site since the project area lacks the

critical mass of both symbiotic retailers and population to support this type of use at this location. Other commercial uses, such as hospitality, also do not appear viable at this location. This would also most likely be the case even if a new interchange were proposed.

- Minimum building standards: In many business parks there are certain building standards such as masonry fronts, landscaping and yard criteria and the like, that are intended to preserve and enhance the investments of potential users. The industrial buildings that are currently in place on Perry Road at the proposed entrance to the site are fairly low grade, and if this type of development were allowed in the proposed project, then the types of uses attracted will be commensurate with the existing building type. The type and quality buildings at the Meadowbrook Industrial Park would be more in keeping with these standards than the types of building currently in place.
- Establishing a gateway: Due to the presence of lower value industrial building near the entrance to the site on Perry Road, a gateway or improved entrance would likely be needed to upgrade the image of the project. Alternative access, such as a new interchange from the bypass could also be considered, however, the cost of such improvement may be impractical for this project to support. However, a possible interchange may be considered more viable if it were also designed to provide better access to the school and the surrounding residential area, adjacent to the project site. In this manner, a possible interchange may also help alleviate commercial traffic, which would be generated from the project site, from traveling through the adjacent residential neighborhoods near the school, if this is how secondary access to the project site is proposed.
- Maintain competitive, if not low pricing: Land pricing for industrial sites have reached new highs, primarily because of the cost associated with developing the land. However, industrial users are typically very cost sensitive, and there is a competitive, if not a significant supply of available land in the region. Milford has a few negative attributes, such as being isolated from the interstate highway network and having a relatively high tax rate, to name two, such that having an attractive pricing schedule should be considered as a method for offsetting these negative features.

It would be reasonable to assume that incorporating these aforementioned considerations with the project, that absorption of the 80± acres could occur within a twenty to twenty-five year time frame. This equates to an average absorption of about 3 to 4 acres per year, which reflects a capture rate of about 80% of the potential future demand to support new industrial and office buildings in Milford. This may seem aggressive, but it is also realistic, considering that the town has a very limited supply of land at a business park.